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THE PRIME MINISTER, THE RT. HON. P. FRASER.

S. P. Andrew and Sons photo.

DAIRY COMMISSION TO BE SET UP

CHANGES IN MARKETING METHODS & FIXING GUARANTEED PRICE

THE Government's intention to introduce legislation as early as possible to set up a New Zealand Dairy Commission to determine the guaranteed price for dairy produce each season and to administer the marketing of the industry's products was announced by the Prime Minister, Mr. Fraser, to the recent Dominion Dairy Conference. The Government's decision was the outcome of negotiations which had been proceeding for some months between representatives of the Government and of the industry.

THE proposals of the joint committee embodying the setting up of the commission were approved by the Government and subsequently by the conference. The commission would have a Government-appointed chairman and equal representation of the Government and the industry.

PRIME MINISTER'S STATEMENT

It would be difficult, Mr. Fraser told the Dairy Conference, to exaggerate the importance of the Government's proposals which had found favour with the conference. Part of the Government's recent election manifesto was that the question of the marketing of dairy produce should be reconsidered and the present methods realigned and altered. The manifesto stated that two beneficial changes could be made in the guaranteed price set-up—the removal of the fixing of the guaranteed price from an atmosphere of bargaining and negotiation and the direct participation of representatives of the dairy industry in marketing.

The opportunity to discharge these obligations to the dairy industry on which the Government was elected arose, said Mr. Fraser, when he received a letter from Mr. W. E. Hale, chairman of the New Zealand Dairy Board, stating that the industry wished to discuss matters with him, mainly prices, particularly in view of the extension of the principle of the 40-hour week in many directions. The urgency of the need for discussion was stressed in the letter.

Opportunity for Complete Review

Mr. Fraser thought, and Cabinet concurred, that the receipt of that letter would give an opportunity for reviewing, if the representatives of the dairy industry were agreeable, the whole position in respect to the purchasing and marketing of dairy produce, and the relationships between the Government and the dairy industry. It was also a favourable opportunity for the Government to put forward to the industry proposals along the lines of the programme on which it was elected.

Negotiations were opened up, the Government representatives being Messrs. B. C. Ashwin, G. M. Pottinger, L. C. Webb, and F. P. Walsh. They met the leaders of the industry and had discussions. It became very clear to the representatives of both Government and industry—and they had passed that opinion on to himself, and he in turn had discussed the matter with Cabinet—that the work ... could be done effectively by one authority. The Government had had quite an open mind on this aspect of the problem so long as what was proposed did not mean

something contrary to the proposals in the election programme to which it was pledged and was acceptable to the industry.

The Government, therefore, told the committee to proceed so long as it was satisfied that what was proposed would not be a violation of the pledges it had made. The results of the committee's work, as adopted by the Government, had been placed before the Dairy Conference as the Government's plan.

Current Season's Prices

Mr. Hale, chairman of the conference, in his short summary of the proposals, touched upon the main principles that had been agreed upon. Mr. Hale had also wanted elucidation on one or two points, and Mr. Fraser said he would deal with one forthwith, because the answer was contained in a reply to a letter he had received from Mr. Hale. Mr. Hale's letter read as follows:—

New Zealand Dairy Board,
P.O. Box 866,
Wellington.

April 15, 1947.

The Right Hon. the Prime Minister,
Parliament Buildings,
WELLINGTON.

Dear Sir,—

In recent weeks a committee of the Dairy Industry Council has been discussing with representatives of the Government proposals for the establishment of a commission to fix the guaranteed price and to market dairy produce. At this stage there is one point on which we think it desirable to seek clarification from the Government. As you will be aware from my letter of January 31, 1947, the demand has been made that farmers and farm workers be placed on the same basis as other sections of the community as regards the 40-hour week and payment for Saturdays, Sundays, and statutory holidays. Furthermore, it has been asked that the price for the current season be reconsidered in the light of this factor.

The Dairy Industry Council, having discussed the proposals, desires me to ask if the powers of the proposed Dairy Industry Commission will enable it to review the current season's price, regard being had to the developments which have taken place concerning the 40-hour week.

Yours faithfully,
(Signed) W. E. Hale,
Chairman,
Dairy Industry Council.

The Prime Minister's reply to Mr. Hale read as follows:—

Prime Minister's Office,
Wellington.
April 16, 1947.

The Chairman,
Dairy Industry Council,
Wellington.

Dear Mr. Hale,—

In reply to your letter of April 15, I desire to point out that the proposed Dairy Industry Commission will be empowered to determine the guaranteed price. The formula by which this price is to be determined will provide that the commission shall take into consideration, among other things

the general standard of living of persons engaged in the dairy industry in comparison with the general standard of living throughout New Zealand.

In recent months action taken by the Government has extended the benefits of the 40-hour week; and these developments could be taken into account by the commission in the practical application of the passage quoted above. Moreover, it would also be competent for the commission to reconsider the price for the 1946-47 season in the light of these considerations. Authority for the commission to do this will be included in the legislation to be submitted to Parliament.

Yours faithfully,
(Signed) P. Fraser,
Prime Minister.

That letter, continued Mr. Fraser, was quite clear and without any ambiguity. The matter would be in the hands of the commission.

Early Legislation Promised

The legislation, of course, would be submitted to the Dairy Board before being introduced, and the board would satisfy itself that the legislation contained the provisions

NEW ZEALAND DAIRY COMMISSION . . .

that the Government and the industry had agreed to. That of course must be done, and there would be no deviation from it. The agreement had been arrived at in good faith and both parties must be satisfied that the agreement was implemented in the legislation. They would ask the Law Drafting Office to go ahead with the job as early as possible and it might be practicable, by agreement with the Opposition, to have the legislation brought before the House of Representatives earlier than was usual. If both sides of the House agreed, the Address-in-Reply debate could be interrupted for that purpose. He would undertake to expedite the legislation as far as possible and in the meantime, before it was introduced to Parliament, the draft could be approved by the Government and the Dairy Board as embodying the agreement.

The matter in his opinion was so important, and so momentous for the future of the industry and the country, Mr. Fraser continued, that there was no room for any doubt whatever arising when the legislation was brought down. Any shadow of misunderstanding, even if such could arise, should be removed before the introduction of this legislation, but the proposals were so clear that he could not imagine any misunderstandings arising. He thought it would be a comparatively simple matter to have the proposal translated into the proper effective legislative terms.

The industry had formulated a marketing scheme and part of the industry's proposals was embodied in the present Government plans. No Government or people who believed in progress could ever come to the conclusion that decisions arrived at at a particular time were necessarily final and immovable. They must be moving forward politically as well as economically. It was the duty of Governments, as of individuals, to learn from experience.

Considerable Step Forward

He considered that the present proposals of partnership between the Government and the industry were a very considerable step forward in industrial democracy If they were ever to have an industrial democracy, the people engaged in producing the wealth of the country must have some say in its production and its realisation. That was the position as he saw it, and as he believed his party saw it. The proposed plan was a step in the right direction.

Selection of Personnel

Whether the scheme would prove successful or not depended on the selections of members of the commission made by the industry and the Government. He wanted to congratulate those responsible for the drafting of the proposals, for in them they had the widest and most co-operative field for careful selection. The industry would put forward a panel of six men whom it could trust and the Government would select three men whom it thought most suitable from among those six. The Government would inform the industry whom it wanted to appoint as its three representatives and the industry would have the opportunity of discussing those appointments. Every effort would be made to have unanimity on the personnel, including the chairman. After all, unless the commission to be set up carried the trust of the industry and the Government, it was doomed to failure from the start, and therefore every possible effort would be made to get a body that was wholly acceptable.

Independent Tribunal

The commission would have the responsibility of fixing the guaranteed price. In that respect there would be no provision for either Governmental or Ministerial

direction. The Government's election manifesto had promised an independent tribunal. Therefore, if this one body was to do the whole job, it must have the necessary powers of a tribunal in regard to the guaranteed price.

There was provision in the agreement that if the wheel turned as it seemed to be doing in the case of some of their primary products, and world markets began to fall, and if the commission had come to the conclusion that the price it was going to fix was fair but that the money available would not be sufficient without Government financial assistance, it would notify the Government and discuss the matter with the Government before it fixed the price. The Government would be made aware of the situation, but even then the Government would leave the responsibility for fixing the price to the common sense and judicial capacity of the commission.

Marketing Responsibility

Quite obviously the present Marketing Department would be used for a period, but if the new commission wished to reorganise it, it would be competent for it to do so. They did not want a commission to be set up without having adequate authority, because without that, it would fail in its work. The Government wanted the commission to be set up to feel that it had full authority, subject only to Government policy. That policy included stabilisation and overseas marketing arrangements. Until 1950 they had a Government-to-Government contract with the United Kingdom, but so far as marketing generally, subject to and within the scope of the Government policy, and price fixing were concerned, these would be the responsibility of the commission.

Physical control of the produce, the fixing of the guaranteed price, transport arrangements, and such questions of detail as whether the price should be paid for the butter in store or f.o.b. were all to be matters for the commission in the same way as they had up till now been matters for the Export Marketing Department.

Co-operation in Practice

He had already explained that the 1946-47 price could be reviewed by the commission and that all factors could be taken into consideration. He would like to express the hope that while he did not know whether the new proposals would remove the industry entirely from politics, it would lend itself less to party politics. Apart from those associated with Government policy, there would be no directive from the Government in regard to details. In price fixing the commission would not be under direction, but it would be under an obligation to consult and discuss with the Government if the financial position was such that the proposed guaranteed price could not be met from the financial returns from overseas. That provision was just plain common sense. He thought the present arrangement was not only important to the industry but that it would also be an example to the country generally of co-operation in practice. . . .

The Government would put the agreement into legislation and a new phase in relationship between the Government and the dairy producers would be commenced and be an example of the proper attitude to be taken by all if the country was to go on as they wanted it to go on from prosperity to prosperity.

DAIRY CONFERENCE'S APPROVAL

THE proposals had been considered and approved by the Dairy Conference, Mr. Hale told the Prime Minister, subject to the legislation being in the form that would give effect to what was the understanding of the joint committee.

Industry members of the committee had not had the privilege of discussing these proposals with the Prime Minister personally, and therefore it was only fair and proper that he should indicate the interpretations which the industry representatives had made to conference in explaining their understanding of the proposals.

"We have indicated," said Mr. Hale, "that in our opinion a genuine effort has been made by the Government to remove the affairs of the industry from the political arena. Also that the approach from both the Government and the industry should be one of full co-operation, and that this is most essential if the commission is to start on a satisfactory basis. In other words it is not, in my opinion, to be a fifty-fifty arrangement, but a full joint effort to serve our largest industry, which plays such an important part in the economic structure of the Dominion.

"The proposals have been explained to conference as giving to the commission complete and absolute control of all butter and cheese produced within the Dominion; that the proceeds for export butter and cheese will be paid to the credit of the commission's account; that if butter and cheese are sold on the local market below the guaranteed price fixed for any season, the difference will be paid into the commission's account from Government funds, and that in order that the commission can be a body which will carry the confidence of the Government and the industry the persons selected shall be acceptable to both the Government and the industry."

Mr. Hale said it was not possible to finalise all the details of a proposal of the magnitude of the one under consideration, but the conference had been informed that it was expected and understood that the legislation when drafted would be submitted to the Dairy Board for consideration and would in its final form be acceptable to both parties, and that in the proposed legislation authority would be given to the commission to review and adjust the price for the 1946-47 season, regard being had to the altered conditions brought about by the Government action and other changes in the relative position of the dairy farmer with other members of the community.

"One thing that concerns the conference," continued Mr. Hale, "is the question of the chairmanship of the proposed commission. We believe that the chairman should have a good working knowledge of the industry, and that in order to make the proposals workable and to give confidence to the industry the chairman should be a person who would carry the full confidence of the Government, the industry, and the country. . . .

"The joint committee was in full agreement with the proposals as outlined and the points that I have directed attention to. If the understanding reached is carried through, I think the Government, the joint committee, and the conference will have achieved something that will fulfil the long-felt wants of dairy farmers with improved relationship calculated to increase production."

THE DAIRY COMMISSION

Joint Committee's Recommendations

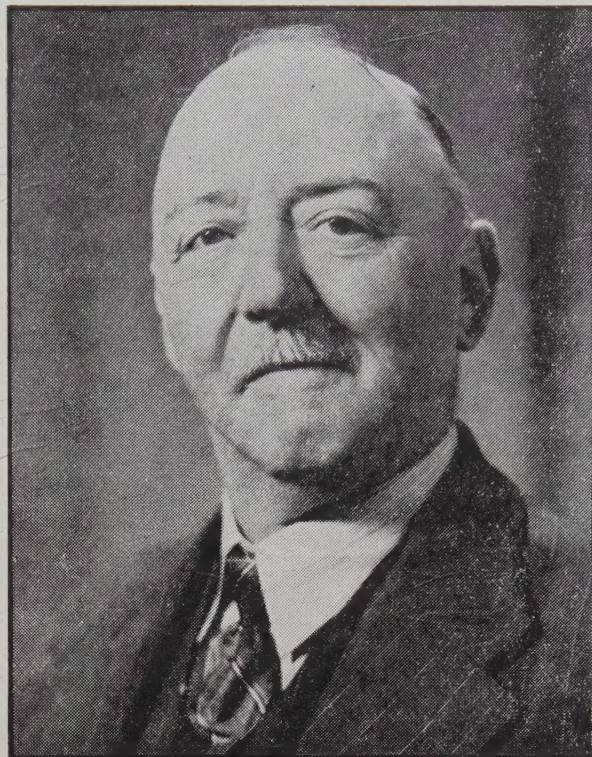
IT is recommended by a joint committee comprising representatives of Government and of the dairy industry that:

1. There shall be appointed a commission to be called the New Zealand Dairy Commission.

2. The commission shall consist of seven members to be appointed by the Governor-General on the recommendation of the Minister of Marketing, of whom:

(a) Three members shall be appointed on the nomination of the Minister after consultation with the New Zealand Dairy Board;

(b) Three members shall be appointed from a panel of six names nominated by the New Zealand Dairy Board;



[S. P. Andrew and Sons photo.

Mr. W. E. Hale.

and the Minister shall consult the said board before recommending to the Governor-General;

(c) A chairman shall be appointed on the nomination of the Minister after consultation with the New Zealand Dairy Board.

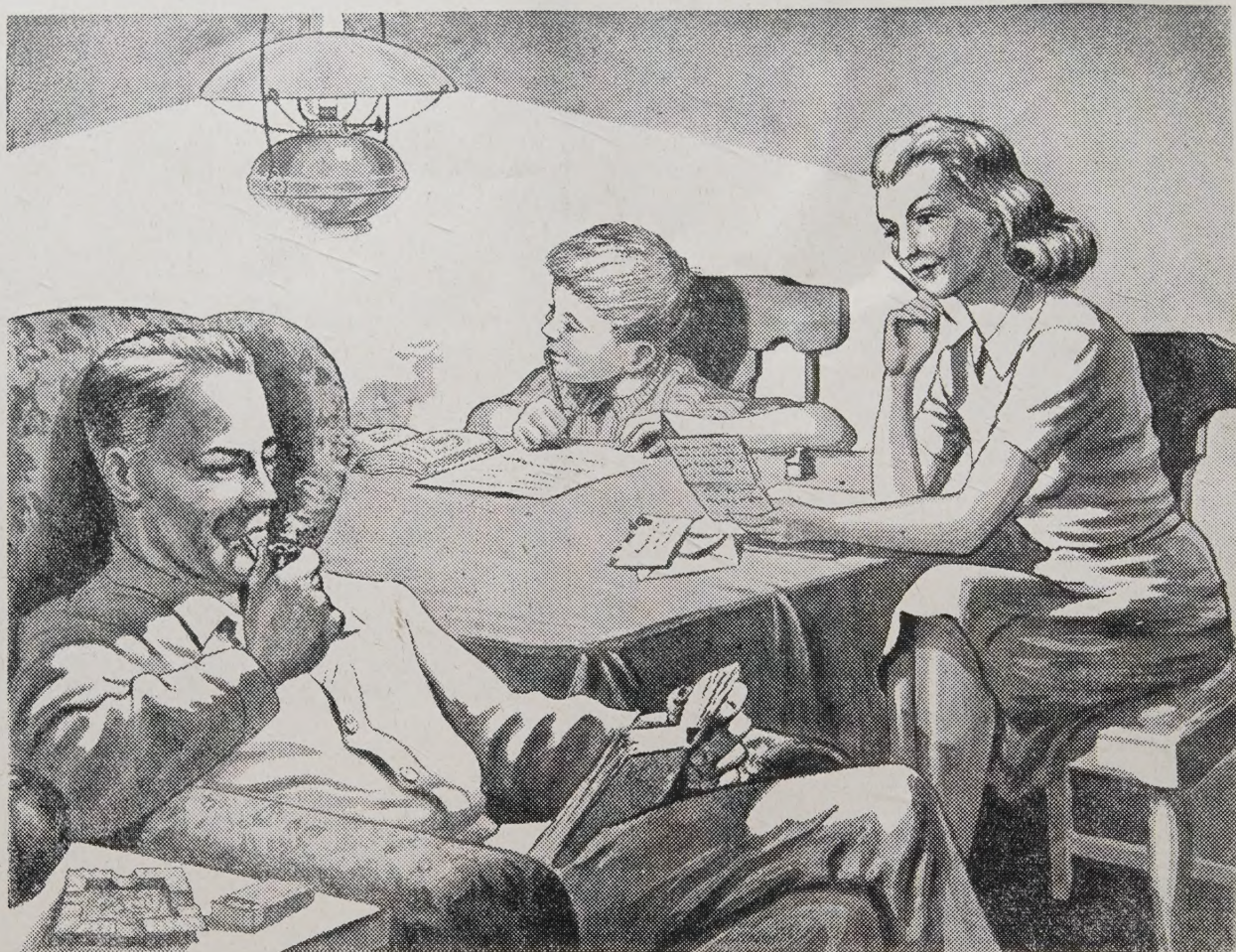
3. The commission be a body corporate.

4. (i) The chairman of the commission shall be appointed for a term of five years, the retiring chairman to be eligible for reappointment as chairman or as a member of the commission. Any appointment to fill an extraordinary vacancy shall be for a term of five years.

(ii) The first appointments of members of the commission shall be for a term not exceeding five years, provided that at the end of the third year two members to be selected by ballot shall retire, and similarly two original members (or persons appointed to complete a term of office of original member) shall retire by ballot at the end of the fourth and fifth years respectively; and also provided that of the two members retiring at the third, fourth, and fifth years respectively, one shall be a member appointed on the nomination of the Minister and one a person appointed on the nomination of the New Zealand Dairy Board.

(iii) Appointments of members shall be for a term of five years, provided that extraordinary vacancies shall be filled for the unexpired term of appointment of the member being replaced.

(iv) For appointments of members nominated by the New Zealand Dairy Board (other than the original appointment), the New Zealand Dairy Board shall nominate a panel of two names for each vacancy from which the Minister shall recommend the appointment after consultation with the New Zealand Dairy Board. Similarly where an appointment of a Government nominee is required to fill a vacancy the Minister shall consult the New Zealand Dairy Board.



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(v) Every member shall hold office until his successor is appointed.

(vi) Retiring members of the commission shall be eligible for reappointment either as members or as chairman.

(vii) The chairman of the commission shall not—

(a) Be a member of either House of the Legislative Assembly;

(b) Be a member of the New Zealand Dairy Board;

(c) Hold any other paid office under the Crown or from any other statutory corporation;

(d) Be concerned or interested (other than as a member in an incorporated company under the Companies Act or Friendly Societies Act) in any commercial undertaking.

(viii) Members of the commission shall not be members of the New Zealand Dairy Board.

5. That Section 17 (2) of Primary Products Marketing Act be repealed and that the commission be given powers to make such arrangements as it thinks fit:

(a) For the handling, pooling, transport, and storage of any dairy produce to which this part of this Act applies;

(b) For the shipment of any such dairy produce that is intended for export, on such terms and in such quantities as the commission thinks fit;

(c) For the insurance against loss of any such dairy produce;

(d) Generally for all such matters as are necessary for the exercise of any of the powers herein expressly conferred;

(e) For the sale of dairy produce to the best advantage.

6. Repeal Section (18) of Primary Products Marketing Act and vest authority in commission to purchase at f.o.b. all butter and cheese for export.

7. That provision be made for regulating local market costs and distribution.

8. That the commission be given power to determine the guaranteed price by re-enacting Section 20 (4) and (5) of Primary Products Marketing Act.

9. Clause 8 above to be subject to proviso that in determining prices commission will have regard to the general economic stability of New Zealand.

10. The price determined by the commission for any season shall be guaranteed by the Government.

11. If the Dairy Industry Account is in debit, or if the Estimates for the ensuing season indicate the possibility that the Account may be in debit, then the commission shall consult with the Minister of Marketing before fixing the guaranteed price for the ensuing season.

12. That the commission should have the responsibility of tendering advice to Government:

(i) On trends and prospects in overseas markets;

(ii) On movements in costs, prices, or other factors likely to prejudice economic stability of the dairy industry.

13. That in the exercise of its functions, with the exception of those in 8 and 11 above, the commission shall comply with the general trade policy of the Government and with any general or special directions issued by the Minister.

14. Commission may delegate any of its functions save that of determining the guaranteed price to an agent or agents whether in New Zealand or overseas. Authority to be given Export Marketing Department to act as agent.

15. That the transfer of Dairy Industry Account, including the Dairy Industry Stabilisation Account, to the custody of the commission be authorised.

16. That the commission shall present an annual report to Parliament.

INDUSTRY COMMITTEE'S VIEWS ON PROPOSALS

THE industry committee believed the proposals of the Government for the setting up of a New Zealand Dairy Commission would lead to the solution of the major difficulties within the industry, said Mr. C. P. Agar, who, on behalf of the industry committee responsible for the negotiations with the Government representatives, outlined the proposals to the Dairy Conference.

Panel Selection by Conference

The Dairy Board was mentioned as the body to be consulted by the Government in regard to 2 (a), (b), and (c), but it did not follow that the Dairy Board would make these appointments, but that the appointments should be made by the Dominion Dairy Conference.

The panel of six nominees would be selected and the names would be discussed with the Government. While the Government had not got to approach those whom it thought fit to appoint, so that alteration could be made on the industry's recommendation, it would be impossible to reconvene the Dominion Dairy Conference in order to give further consideration because some names submitted by conference had been found unacceptable to the Government. It was also a safeguard to the industry that there should be a panel in order that the best men could be selected for these important positions.

Powers of Commission Outlined

Explaining Clause 5, Mr. Agar said that the powers that at present were in the hands of the Minister under section 17 (2) of the Marketing Act would be taken out of his hands and put in the hands of the commission. Clause 6 was also replacing the Government and the Minister by the commission, which would be the buying authority and would be responsible for the marketing of the produce and the price received. Clause 7 laid down that provision would be made for regulating local market costs and distribution. That was the wording of the draft, and what it meant to the industry was that the control of butter on the local market would be by the commission and it would not be under political control.

Clause 8 meant that after the commission had surveyed the position and received submissions from the industry the commission determined the guaranteed price. Cost allowances would disappear and become part of the price and the commission's decision would be final so far as both the industry and the Government were concerned. This clause would be subject to the proviso that when determining prices the commission would have regard to the general economic stability of New Zealand. That was a clause included in every piece of legislation of this type, said Mr. Agar. It meant what it said, "that due regard had to be taken of the economic stability of the country," which was in the interests of the industry.

Clauses 10 and 11 meant that so long as funds were available the commission should go straight ahead and fix the price, said Mr. Agar. If the account was in debit, or likely to go into debit, the commission would consult with the Government. The Government was exempted, however, from having any final say in the guaranteed price by a later clause.

Clause 12 meant that the commission, in examining costs in this country and the price likely to be received, would be the first to see danger affecting the stability of the country, and under the legislation would have power to make representations to the Government on actions that should be taken in order to protect suppliers.

No Government Control in Fixing Price

Dealing with Clause 13, which laid down that in the

NEW ZEALAND DAIRY COMMISSION . . .

exercise of its functions, with the exception of those under Clauses 8 and 11, the commission should comply with the general trade policy of the Government and with any general or specific directions issued by the Minister in terms of Government policy, Mr. Agar pointed out that Clause 8 was the power given to the commission to determine the guaranteed price and Clause 11 was the one referring to what would happen when the account was in debit. Supposing the Government thought that the price should be 1/6 and expressed that view, the commission would have due regard to the weight of that opinion, but if the commission considered the price should be 1/9, the Government had no control in any shape or form so far as the powers of the commission were concerned. That was a most important clause put in by the Government itself with the idea that if the commission was to come into being, the commission and the industry must be removed from political control.

The point of Clause 14 was obvious. If the scheme came into operation for the 1947-48 season, the Export Marketing Department would have to act, because it was an organisation originally brought into being by the Dairy

Board and experienced in doing the work; when wartime controls were finally abolished on other products marketing control would revert to the commission, because dairy produce would be the only product requiring it.

Clause 15 left no doubt whatever about whether the industry's stabilisation funds were safe for its own purposes.

Position Regarding Local Market

The clauses concerning the local market were not in the report, but had been discussed since and agreed upon. It was agreed that local butter and cheese should be paid for at the guaranteed price and any difference below the guaranteed price and price fixed under Government policy direction would be made up to the commission by the Government. If it were in the Government's mind that they must hold down the price of food and they directed the commission to sell retail at 1/6, then it was from the Consolidated Fund that they would have to make up the costs of production. It was a fundamental policy of stabilisation that for the goods consumed within the Dominion producers were entitled to the costs of production but not the export price. That was the practice right through, and in this case the price to which the producer would be entitled would be the guaranteed price.

CARE OF ELECTRIC MOTORS

Some Safety and Economy Measures

WITH the present difficulty of replacing electric motors and other electrical equipment and the urgent need for their continual use in the production of foodstuffs for overseas consumption, the protection, care, and maintenance of electric motors today are of vital importance. Given reasonable care, electric motors should provide 25 to 30 years' service at low cost and without trouble, but neglect can cause a motor to wear out in a year or perhaps burn out in a few minutes.

The following points should assist motor users to avoid expense and inconvenience which may occur from lack of proper attention:—

Burning out of Motors: One of the chief causes of three-phase motors burning out is the failure of one phase. This may be caused by the blowing of a fuse, loose contacts, or damage to power lines by falling trees, lightning, etc. In such cases the motor will make a peculiar humming noise. Switch it off immediately and call your electrical service engineer.

Oiling and Greasing: Three-phase motors operating milking and shearing machines and water pumps must be greased and oiled once every two years, and only high-grade oil and grease should be used. Care should be taken not to put oil and grease in the bearings too frequently, otherwise the lubricants will find their way to the winding insulation when the

bearings overflow and deterioration of the insulation may result.

Motor Pulleys: Serious damage can be done to a motor by hammering pulleys off and on the drive shaft. The best method of having this work done efficiently and cheaply would be to arrange for an expert to attend to all motors in the district during the off season.

Trees and Hedges must be kept trimmed back to prevent contact with service lines, as this can cause loss of time, inconvenience, and damage.

Small Motors on separators, small water pumps, and other equipment are often damaged or badly worn because of:

1. Water or milk being allowed to fall on the motor.
2. Over-oiling — two drops every month are generally all that is required.
3. Too tight a belt. The separator motor should always be assisted until the load is taken up.
4. Repairs being attempted by the farmer himself.

It is most important that three-phase motors attached to water pumps and other machinery which are not directly under the observation of the consumer should be protected by special devices such as single-phase preventers.

At all times watch electric motors for over-heating. If the lights go dim, it is always advisable to switch off

motors and refrigerators until power has been restored to normal. If shocks are received from electrical equipment, or sparking or excessive heating is noticed, an electrician should be informed as soon as possible. Full information on motor protection can be obtained from power boards.

Owing to the urgent need for conserving electricity, it is essential that farmers should economise in the use of electric power whenever possible. Equipment such as water pumps, cream separators, churns, refrigerators, feed cutters, mixers, and grinders should be operated during the off-peak period if practicable, and other electrical appliances in the home and workshop should be switched on only when necessary.

A. A. POWELL,
Cool Storage Officer, Wellington.

BOOK REVIEW

"Handy Hints for the Farm"

"Handy Hints for the Farm," a booklet of 96 pages compiled from the "Land" pages of the "Bulletin," comprises a collection of paragraphs of useful information on wheat production, sheep, cattle, pig, poultry, and apiary management, fruit and vegetable growing, and general farm repairs and maintenance. Written primarily for Australian conditions, the booklet nevertheless contains much information which should be of interest to New Zealand readers. Our copy from the New Zealand office of the "Bulletin," Box 965, Wellington. Price 1s.

SUCCESSFUL INCUBATION

Importance of Temperature, Ventilation, and Humidity

SUCCESSFUL incubation depends on correct control of many factors such as the health of the breeding flock, the selection and care of the fertile eggs, and temperature, ventilation, and humidity during incubation. In this article S. G. Haddon, Poultry Instructor, Palmerston North, deals with three important factors—temperature, ventilation, and humidity.

TEMPERATURE in incubation is the factor which causes least trouble. Its control and regulation are almost entirely automatic and provided reasonable care is taken to maintain the heat supply and thermostats in good order, no trouble should be experienced.

A question often asked is why should a flat-top hot-air or hot-water incubator be run at 103 degrees F. when a cabinet incubator is run at 100 degrees F. The manufacturers of the flat-top machines have found by trial that by maintaining a temperature of 103 degrees F. just above the eggs on the tray, the centre of the egg is at 100 degrees F., the most favourable incubation temperature for the growing embryo. A thermometer placed just below the eggs in a flat-top machine would probably register about 97 degrees F. The explanation is that there is a temperature gradient inside the incubator, but the eggs are held at the 100 degrees F. point on that gradient. The temperature gradient is found in all incubators which rely on the natural flow of heated air to warm the eggs.

In the cabinet incubator, however, whether forced-draught or agitated-air type, the temperature gradient does not exist. A thermometer should register a constant temperature (normally 100 degrees F.) anywhere inside the setting chamber. This is because the heated air is circulated mechanically and does not rely on slow convection currents to do its work. Any eggs inside the setting chamber are surrounded on all sides by air at the one temperature of 100 degrees F. and therefore they attain that temperature.

Although it is comparatively simple to maintain an even temperature in the setting chamber of a cabinet machine, there is always a tendency for a rise in temperature in a filled hatching compartment. This is caused by the animal heat developed by the chicks themselves. When a separate hatcher is used and has picked up its temperature after being filled little, if any, additional heat is required because of the amount of heat generated by the chicks themselves.

Ventilation

Ventilation is primarily a means of supplying increased amounts of oxygen to the growing embryo and removing the carbon dioxide given off. In flat-top incubators ventilation is combined to a large degree with the flow of the heated air which enters at the top of the egg chamber, cools, and descends out through the bottom of the machine. Additional fresh air may be admitted through controllable vents usually placed high up in the egg chamber.

Unless adequate precautions are taken, any increase in ventilation with its speeding up of the air flow would lower the temperature. This drop is balanced by the action of the thermostatic wafers or capsules causing the incoming air to enter at a higher temperature. The temperature gradient is still there but it is steeper, and the eggs on their tray are still at the 100 degrees F. point on the gradient.

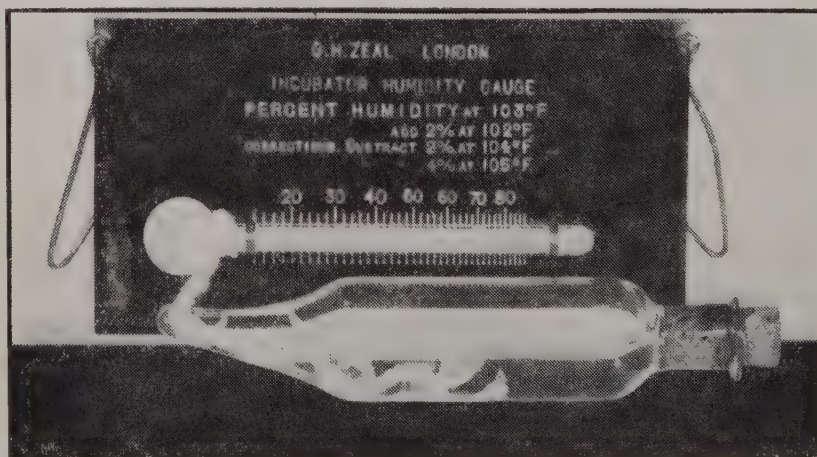
In the cabinet type of incubator provision must be made for used air to leave the machine as well as for fresh air to enter. These inlets and outlets vary in position and number accord-

ing to the make and size of the incubator.

A cabinet machine with all the vents shut is like a closed box. It should be obvious that air will not flow into the box unless room is made for it by allowing air to flow out; hence the necessity for air outlets in a cabinet incubator. It should also be obvious that intelligent use must be made of the air outlets in conjunction with the inlets, as air will not flow in faster than it is flowing out. The converse is not strictly true, as the rotating blades or paddles have a tendency to force the exhaust air out through the outlets. This warm air may often be felt pulsing out when the hand is placed close to an open vent.

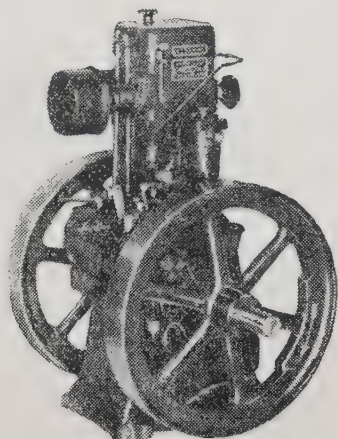
To obtain the best results it is not sufficient to operate the ventilators on a machine correctly. The actual incubator room must also be adequately ventilated, otherwise stale used air is circulated through the incubator with detrimental results.

The ventilators of an incubator room should permit eight changes of air an hour without causing draughts. This is attained by having the free air inlets equal in area to two and a half times the area of the free outlets, and by allowing 1 square inch of free inlet for each 50 to 60 cubic feet of air that has to be passed. For example, an incubator room 10ft. x 12ft. x 8ft. gives a cubic capacity of 960 cubic feet. There must be eight changes of air an hour; therefore the hourly total is 7680 cubic feet. This number divided by 50 will give the area of the inlets required—153.6 square inches. An opening 12in. x 15in. would meet these requirements. The outlet would be two and a half times smaller than this—61.4 square inches. Therefore the outlet should be 10in. x 6in., though 12in. x 6in. would probably not be too big in proportion to the inlets. All ventilation openings



Wet-bulb thermometer to determine humidity. The wick surrounding the bulb reacts to atmospheric humidity, which is recorded on the gauge.

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should be controllable, as high winds will speed up the air flow and cause draughts.

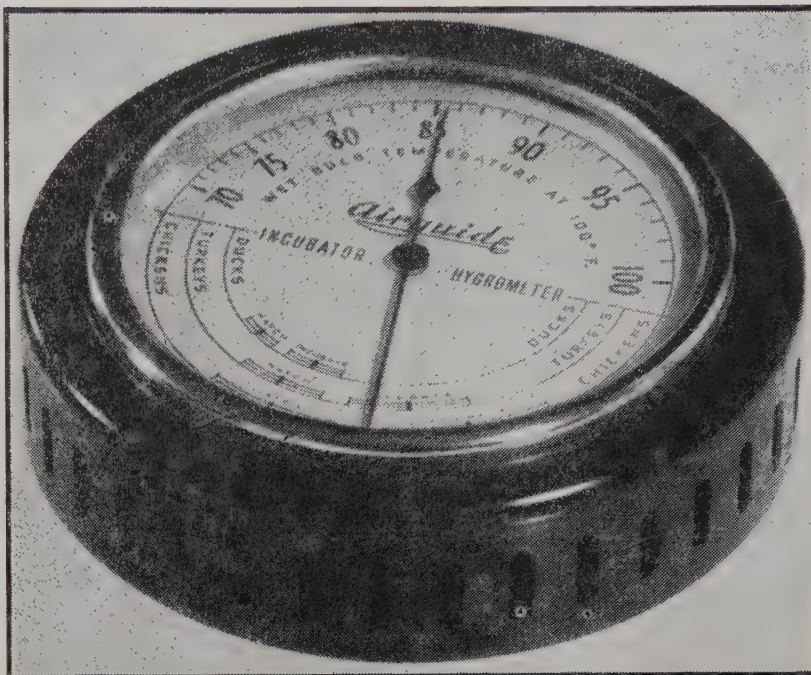
Humidity

Humidity is the factor which causes most trouble. It has been found that absolute humidity is unimportant in incubation; it is the relative humidity that counts. Absolute humidity is the actual weight of water vapour held in a given amount of air. This amount will vary with the temperature of the air. For example, 1000 cubic feet of air at 50 degrees F. in a saturated state will hold .587lb. of water; at 60 degrees F. it will hold .821lb.; at 70 degrees F., 1.16lb.; and at 100 degrees F., 2.851lb. Relative humidity is the ratio between the amount of water actually present and the amount of water the given volume of air can hold at that temperature. If 1000 cubic feet of air at 50 degrees F. was holding .404lb. of water vapour, it would contain 67.5 per cent. of .587lb., which is the maximum amount that 1000 cubic feet of air at 50 degrees F. is capable of holding. The relative humidity is therefore said to be 67.5 per cent. Similarly, if it was found that the same volume of air at 50 degrees F. was holding .232lb., the relative humidity would be 39 per cent.

Experimental work has shown that a relative humidity of 60 per cent. in the setting chamber gives the best results. This figure should be taken as a guide until experience teaches otherwise.

There are two methods of determining relative humidity. The first method makes use of the fact that water vapour has weight and therefore exerts pressure. This pressure is a direct measure of the amount of water vapour present. The hygrometer, with a circular dial and pointer, makes use of this principle, using a mechanism similar to the familiar barometer. A sensitive metal bellows is compressed or allowed to expand by variations in the external pressure and this slight movement of the bellows is altered

SUCCESSFUL INCUBATION



The hygrometer determines humidity by the reaction of its pointer to the pressure of water vapour on a sensitive metal bellows in the mechanism.

into a large movement of the pointer across a circular scale. The scale, instead of using pressures or pounds per square inch, is graduated in percentages of relative humidity, with a high percentage corresponding to a high pressure and a low percentage to a low pressure.

Wet-bulb Thermometer

The second method is entirely different and makes use of an instrument known as a wet-bulb thermometer. It is the same as an ordinary thermometer except that the bulb is tied up with a piece of cotton wick which dips into a narrow-mouthed vessel holding distilled water.

The rate at which water will evaporate is governed by (a) the amount of water vapour already present in the air, and (b) the actual movement of the air, for example, a strong wind or a light breeze.

If a wet-bulb thermometer is placed in a cabinet incubator that is at its normal running temperature but has no moisture in it, the distilled water in the small container promptly commences to evaporate rapidly from the wick surrounding the wet bulb. This cools the wet bulb below the temperature of the air inside the incubator and causes the thermometer reading to change. This cooling is an effect which is the direct result of the evaporation of the water from the wick surrounding the wet bulb and one which varies directly with the rate of evaporation—rapid evaporation means marked cooling and slow evaporation a less degree of cooling. As the rate of evaporation depends on the amount of water vapour already present, the degree of cooling of the wet bulb through evaporation must also depend on the amount of water vapour already present, and this forms the link between wet-bulb readings and the humidity.

Relative Humidity Table in Percentages.

Dry Bulb
Degrees F.

Wet Bulb Degrees F.

	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
98	49	51	54	57	59	62	65	68	71	74	77	80	83	85	90	92				
99	47	49	52	54	57	60	62	65	68	71	74	77	80	83	86	90	93			
100	45	47	50	52	55	57	60	62	65	68	71	74	78	80	83	86	90	93		
101		45	47	50	52	55	57	60	62	65	68	71	74	77	80	83	86	89	92	
102			45	48	50	52	55	57	60	63	65	68	71	74	77	80	83	86	90	93
103				46	48	51	53	55	58	60	63	66	69	72	75	77	80	83	87	90
104				45	46	49	51	53	56	58	61	64	67	69	72	75	78	81	84	87
105					45	46	49	51	54	56	59	62	64	67	70	73	75	79	82	85

Relative humidity may be found from the table above by reading across from the dry-bulb reading and down from the wet-bulb reading. The figure given where the two intersect is the relative humidity percentage.

If the incubator in the first place contained filled water vessels, its atmosphere would already be holding water vapour when the wet-bulb thermometer was placed inside. The rate of evaporation would then be slower and the amount of cooling of the wet bulb would be less than in an incubator with no moisture.

Scientists, making use of this principle, have worked out tables from which an operator knowing the dry-bulb temperature and the wet-bulb temperature (or the difference between wet and dry bulbs) may read off the relative humidity. Wet-bulb thermometers in which the scale of degrees has been replaced with a scale of relative humidity percentages are obtainable, but corrections have to be applied to compensate for varying dry-bulb temperatures.

In the foregoing it has been assumed that the interior of the incubator is at a constant temperature. When the temperature (the dry-bulb temperature) is altered the results are different. Hot air requires a far heavier weight of water vapour to saturate it than the same amount of air at a lower temperature. Relative humidity is a percentage of this weight and is therefore dependent on the dry-bulb temperature, so that any alteration in the dry-bulb reading must automatically affect the relative humidity unless steps are taken to maintain it.

Raising the dry-bulb temperature

will decrease the relative humidity because the hotter air is capable of holding more moisture. Lowering the dry-bulb reading will increase the relative humidity because the cooler air cannot hold so much water vapour. To maintain a given relative humidity in the first case moisture must be added; in the second case moisture must be removed.

If the ventilators of the incubator are opened up while the dry-bulb reading is kept constant, the relative humidity will be affected by the actual movement of air. Most people know that wet clothes dry more quickly on a windy day than on a calm one; the rate of evaporation is speeded up. This is largely caused by the fact that as fast as the air absorbs water vapour, it is replaced by air which has not yet absorbed its quota of vapour. This applies exactly to an incubator with its ventilators open. The moisture-laden air passes out and is replaced by drier air entering the machine. There is therefore a marked tendency for the relative humidity to fall and this must be compensated for by adding additional moisture when using the ventilators.

Temperature, ventilation, and relative humidity are closely linked together and the solution to many incubation problems lies in the realisation of the relationship between these three factors.

WATERFOWL INVESTIGATION

Information Required About Banded Birds

THAT better methods of conserving waterfowl may be found, to the benefit of sportsmen and native bird lovers, the Wildlife Service of the Department of Internal Affairs is seeking the co-operation of the public, particularly country people, in an investigation into the habits and problems relating to these birds. As the matter is one of vital importance to acclimatisation societies, they are giving the undertaking all possible help. The initial work is being done in the Manawatu area.

Urgent and concerted action is necessary if the downward trend in the duck and waterfowl population is to be stayed. In some cases the protected waterfowl is threatened with extinction. Action based on scientific knowledge, it has been found in other countries, has done much in the way of arresting the decrease, but in New Zealand the basic information on the causes which may be responsible for the decline is not available and for this reason the survey is being conducted.

An important step is to live-trap the birds, mark them in some way, and then liberate them. Thus may be learnt the dispersal from the place of banding, and the proportion of ducks shot at different ages. When birds are liberated each carries a mark in the form of an aluminium band attached to the right leg, bearing a number and the following address: "Internal Affairs, Wellington, N.Z."

All persons are requested to:

- (a) Retrieve the band.
- (b) Send it to the Controller, Wildlife Branch, Department of Internal Affairs, Wellington, or to the nearest acclimatisation society secretary, or ranger, with a note of the following:
 1. The date.
 2. The locality where the bird was shot or found.
 3. The sender's name and address.The full co-operation of all is asked to assist in the survey by forwarding the information sought.

PASSION FRUIT CULTURE

Passion fruit culture is the subject of Bulletin 135, available free from offices of the Department of Agriculture. Though the booklet is prepared chiefly for the commercial producer, the information will be found equally helpful for the home gardener.

Transporting Sheep in Pelorus Sound



[Photo and information supplied by R. T. Wearne.]

Owing to the isolated nature of much of the farming land skirting Pelorus Sound the only way many farmers have of bringing out their sheep is by "punt." The punts are towed by high-powered launches which travel between the outlying farms and Havelock. So busy are these punts at times that they are moving continually throughout the day and night. From Havelock the sheep go either by road transport or on the hoof 26 miles to the nearest railhead at Blenheim, from where they are trucked to Christchurch and other centres.

The punt in the illustration is shown pulling into the wharf at Havelock with a full load of 550 sheep.

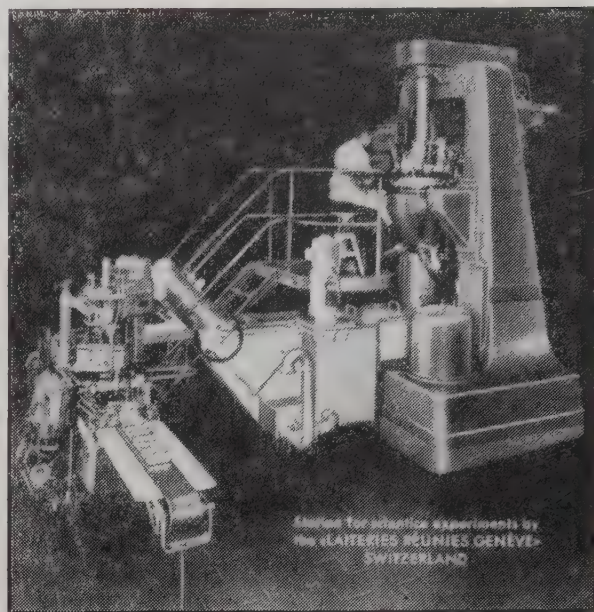
NEW BUTTERMAKING PROCESSES

THE butter industry of New Zealand is of major importance to the national economy, and over the years the industry has kept well to the forefront in organisation, manufacturing methods, economy of manufacture, and above all in quality. Principal markets are overseas, and it is a continuous aim to meet market requirements and produce butter of high quality with the greatest possible economy.

Since the churning of butter first began the process, whether in the home, on the farm, or in the largest factories, has been based on the same principle, that of causing the butterfat to aggregate by concussion; this process has been carried out in batches in the familiar churn.

During the past few years research workers have been exploring possibilities of producing butter by differing physical changes, and now there are several novel principles by which butter can be made continuously and without the churn as it is commonly known. Developments which have taken place in Germany, Switzerland, and Sweden have been closely watched by New Zealand representatives, and Mr. F. H. Taylor, of the Dairy Division staff, has been intimately concerned with these investigations. After the Director-General of Agriculture, Mr. E. J. Fawcett, had inspected some of these new plants last year he recommended to the Government the purchase of a Senn machine from Switzerland and an Alfa machine from Sweden to be placed under practical trials in New Zealand. Orders for these machines have now been placed by the Government and they should be available for trial here within a few months.

Although the Government has taken the initiative in purchasing these new machines, it is recognised that the matter is one of vital importance to the dairy in-



The Senn machine.

dustry and that the industry should share in the control of the trials.

Both the Senn and Alfa machines were ordered through the National Dairy Association, which arranged the purchases without the usual sales commission. The project has been discussed with the Dairy Board and Dairy Research Management Committee, and both organisations have expressed their approval of the Government's action.

Trials of these new machines will be controlled by a Buttermaking Processes Committee set up by the Minister of Agriculture. Dairy industry organisations were asked to co-operate and to nominate representatives, and the personnel of the committee is as follows:—

H. A. Foy, Director of the Dairy Division, Department of Agriculture, chairman.

A. J. Murdoch, member of the New Zealand Dairy Board.

W. Marshall, chairman of directors of the New Zealand Co-operative Dairy Company Ltd.

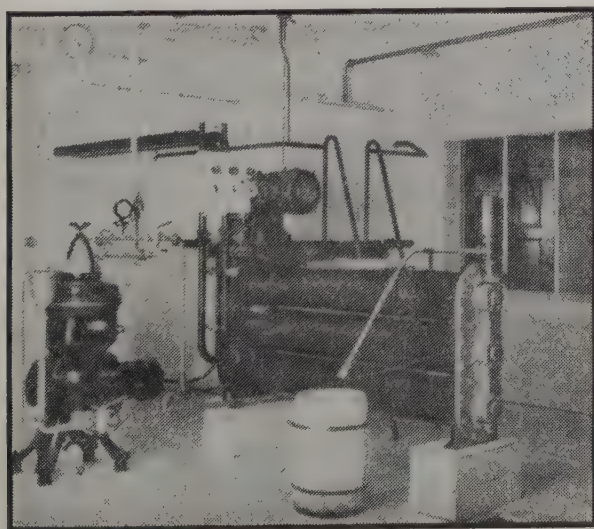
F. Parsons, chairman of directors of the National Dairy Association of New Zealand Ltd.

Professor W. Riddet, Director of Dairy Research, Dairy Research Institute.

G. M. Pottinger, Acting Director of the Export Division, Marketing Department.

The first meeting of the committee was held recently and matters of policy in carrying out the trials were decided.

The Senn machine is to be located at the Tirau factory and the Alfa at Waharoa. Both of these



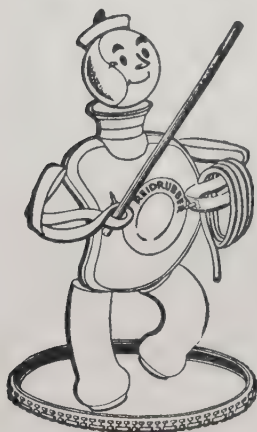
The Alfa machine.

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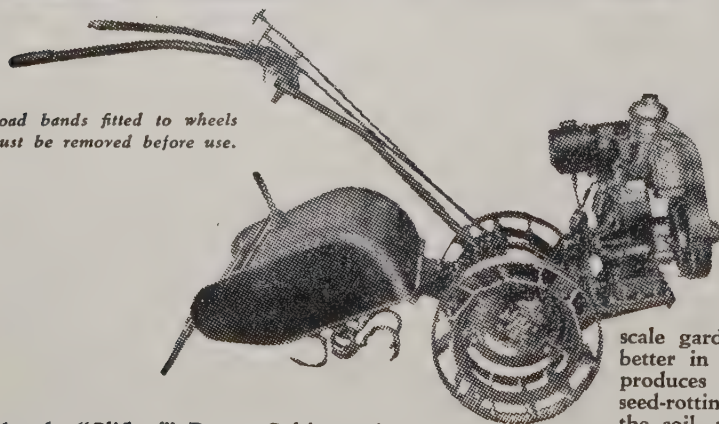
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NEW BUTTERMAKING PROCESSES . .

factories are operated by the New Zealand Co-operative Dairy Co. Ltd., which has agreed to place the necessary facilities at the disposal of the committee.

It is very important that every possible angle of the trials be covered, and the committee proposes to separate the trials into three phases.

- (a) An exploratory period to provide a basis of knowledge of methods of operating the plant.
- (b) A period during which the quality of the butter made by the processes and the variations in treatment necessary with the seasonal variations in the nature of the butterfat can be studied.
- (c) A final period of straight running of the machines for a trial of the economics of the processes.

The committee was fortunate in having access to a report by Dr. F. H. McDowall, of the Dairy Research Institute, Palmerston North, and Mr. G. Purvis, of the Dairy Division, Department of Agriculture, following their joint investigation in the field.

Detailed work in connection with the trials will be the responsibility of a Technical Subcommittee comprising: —

H. A. Foy, Director of the Dairy Division, Department of Agriculture, chairman.

Dr. F. H. McDowall, Dairy Research Institute, Palmerston North, deputy chairman.

C. H. Courtney, New Zealand Dairy Board.

W. H. Udy, New Zealand Co-operative Dairy Company Ltd.

S. G. Finch, New Zealand Co-operative Dairy Company Ltd.

B. W. Harvey, Kaipara, New Zealand Dairy Factory Managers' Association.

H. J. Petch, Assistant Director of the Dairy Division, Department of Agriculture.

G. Purvis, Dairy Division, Department of Agriculture.

Dr. G. M. Moir, Dairy Laboratory, Department of Agriculture, Wallaceville.

Other technical experts will be co-opted where necessary.

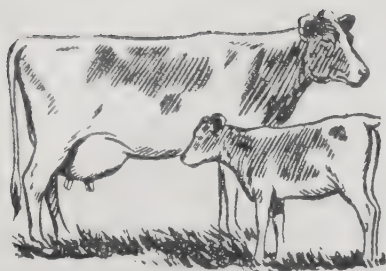
The committee has also recommended to the Department of Agriculture that an officer of the Dairy Division, who would become a member of the committee, should be made available for the direct supervision of the operation of the plants.

Much laboratory work will be involved in the trials, and the assistance to be rendered by the Dairy Research Institute will be of great importance in the final determinations of the value of these new processes.

The committee felt that as the Government had borne the initial costs of the purchase of the machines, the dairy industry as a whole should accept the financial responsibility in connection with the trials, and is therefore making appropriate representations through the New Zealand Dairy Board.

The results of the trials will be of great interest to the Dominion. The dairy industry cannot afford to remain static. Whether these or other new principles of making butter will prove an advantage when applied or adapted to New Zealand conditions cannot be determined unless they are thoroughly explored in our own dairy factories.





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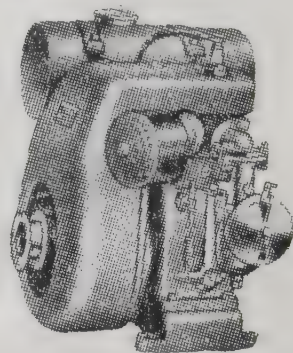
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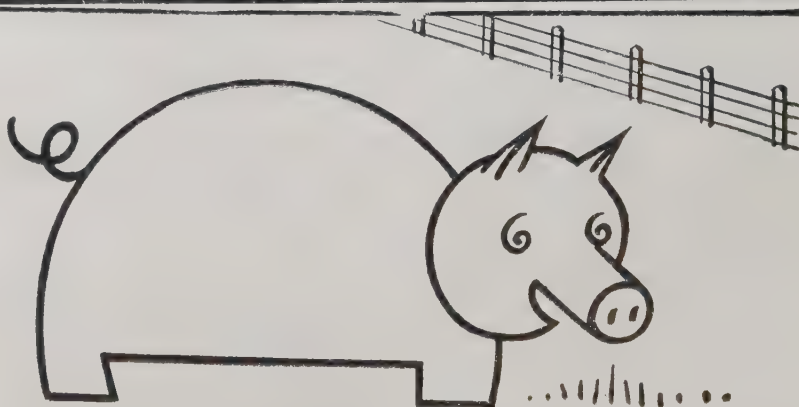
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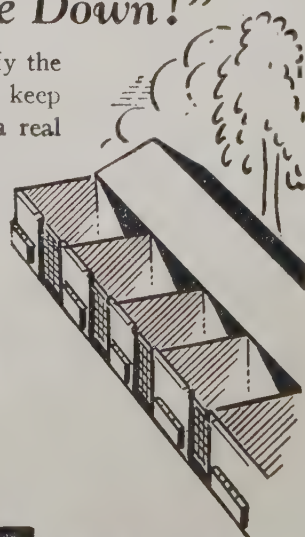
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FARMING IN NEW ZEALAND



The Nelson District

NELSON'S fine equable climate has won for it the name of "Sunshine Province." The agriculture of its counties, naturally partitioned by mountains, ranges from the purely pastoral—dairying and sheep and cattle grazing—to the dominantly horticultural activities such as the growing of fruit, tobacco, hops, and canning crops. Nowhere else in the Dominion is the pattern of farming more diverse and in no other part of New Zealand is more wealth won from so few acres as in the fertile lowlands of the Motueka River. The agricultural activity of the province is described in this article by D. M. E. Merry, Instructor in Agriculture, Nelson, and its horticulture by N. J. Adamson, District Supervisor, Horticulture Division, Nelson.

THE Nelson Province lies in the north-western sector of the South Island, at about the forty-first degree of latitude south of the Equator. There are six counties, Takaka, Collingwood, Waimea, Murchison, Buller, and Inangahua, though Buller and Inangahua come within the terrain usually regarded as the West Coast and therefore have not been included in this survey. The counties are separated by ranges, with at the back a rugged mountainous hinterland forming part of the Southern Alps.

Abel Tasman, the Dutch discoverer of New Zealand, explored this coastline in 1642. Some of his crew were killed in an unfortunate skirmish with the Natives, and what is now known as Golden Bay, because it was the site of the first South Island gold rush, was called Massacre Bay by Tasman.

The capital city of the province, Nelson, nestles on the eastern shores of Tasman Bay, which was named by

the explorer in his own memory. The English explorer and navigator Captain Cook sailed along this coast 127 years later, in 1769. Tasman's landing at Golden Bay is now commemorated by a prominent cliff-top memorial and plaque at Tarakohe, near Takaka township, while a large area of native bush fringing the coast nearby has been set aside as the Tasman National Reserve.

In the Beginning

The storied past of the Nelson Province ranks high in New Zealand's colonial history. Sailing ships brought the pioneers to these shores in late 1841. They landed at Nelson Haven under Captain Arthur Wakefield after going first to Port Nicholson (Wellington) for direction. Governor Hobson wanted them to go to Auckland, but Colonel Wakefield, chief company agent, favoured settlement in Canterbury. A deadlock followed and Cap-

tain Wakefield landed the immigrants from London at Nelson.

As could be expected, exploration of the hinterland began soon after settlement, as good land for farming was a first need. The Motueka Natives held that open tussock country suitable for grazing was to be found nearby, and surveyors and adventurers struck inland in heavily-wooded mountains. Open country was not found in Nelson, however, but in the Wairau Valley, Marlborough. Cotterill, Heaphy, and Brunner are epic names of the early years.

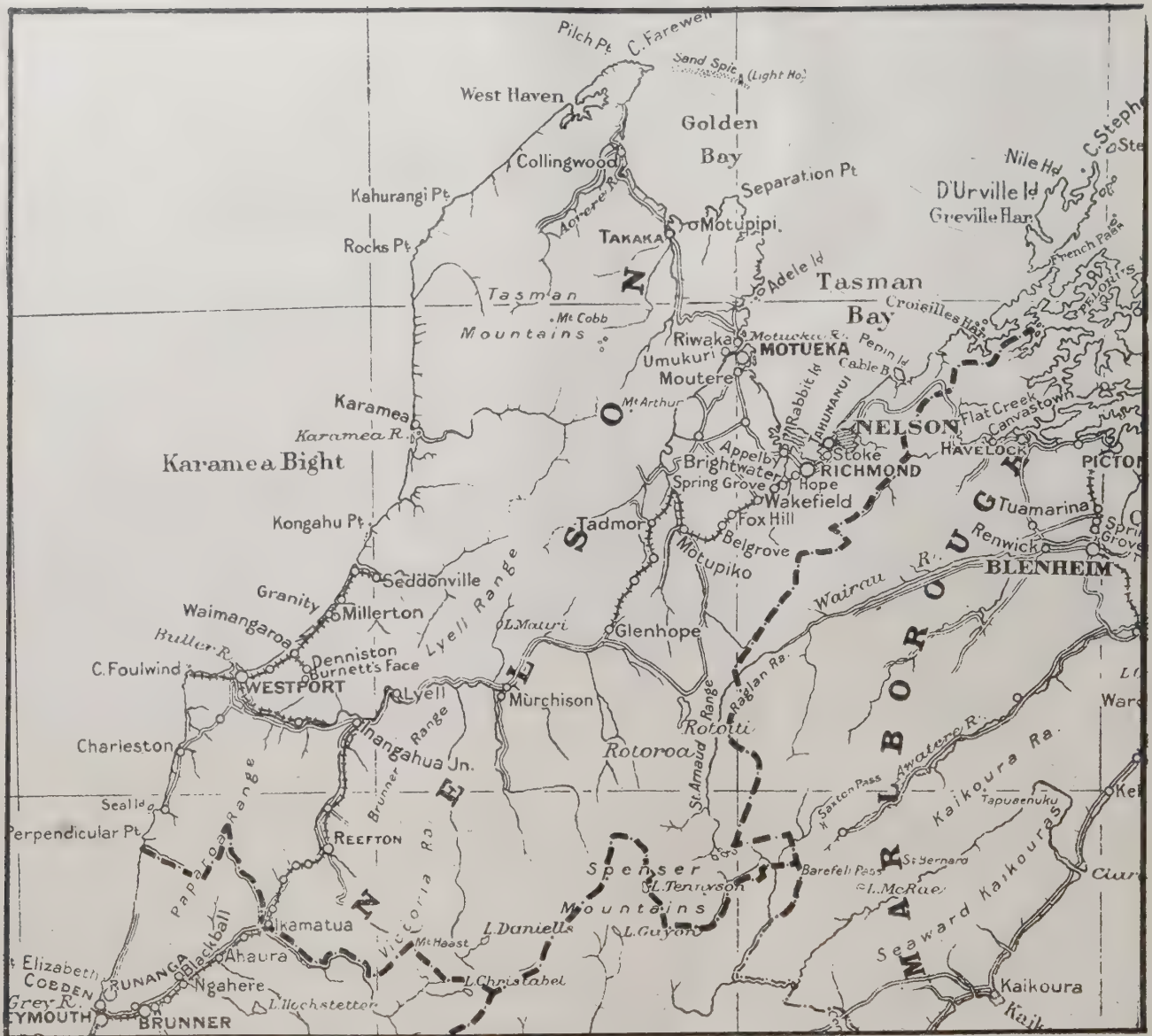
Gold gave impetus to Nelson's colonisation; it was first found near Motueka in 1856 and in the next year at Collingwood, where at one period it was estimated that there were over a thousand diggers.

With the passing of the gold phase, men turned to the land. Waimea Plain and the Motueka flats were cleared, and then the beech forest from the inland hills. Some of the timber was milled, but much was burnt.

English grasses were sown on the clearings, and as in many other parts of New Zealand there was an excellent growth of grass after the burning of the bush. Time has shown, however, that much poor land was cleared which would have been better left in bush. Today the mistakes of yesterday are only too apparent. In this, the second hundred years of New Zealand's settlement, man must take stock of the situation and farm to suit the soil.

Photograph used in heading by Ellis Dudgeon.

THE NELSON PROVINCE



NELSON LAND DISTRICT

The Nelson Land District comprises the following counties: Waimea, Takaka, Collingwood, Buller, Murchison, and Inangahua. In 1943-44 there were 3506 holdings in the land district, total area occupied was 1,163,558 acres, and the average area of holdings was 332 acres. Livestock statistics for the same year were: Horses 4069; total cattle 69,809; dairy cows in milk 29,927; total pigs 15,206; sows one-year-old and over 1925; sheep shorn 393,574; lambs shorn 14,746; lambs tailed 175,753.

FRUIT AND TOBACCO PRODUCTION

At the beginning of 1946 the areas under the principal kinds of fruits grown commercially in registered orchards in the province were: Apples 3254 acres (975,000 bushels); pears 280 acres (85,000 bushels); peaches and nectarines 275 acres (40,000 bushels); plums 47½ acres (6000 bushels). Tobacco production for 1945-46 was from an acreage of 3560, the number of growers being 552 and the quantity sold being estimated at 3,500,000lb.

FARMING IN NELSON PROVINCE



[V. C. Browne photo.]

Nelson, chief town and only deep sea port of the province, from the air.

Topography and Climate

As will be seen from the accompanying map, the Tasman Sea washes the shores in the Collingwood, Takaka, and Waimea Counties, while Murchison and its adjacent valleys lie inland in hilly country. The northerly coastal aspect of the first-mentioned three counties, together with their shelter of mountain ranges, particularly against strong southerlies, ensures a warmer and milder climate than is generally enjoyed elsewhere in the South Island.

A very heavy annual rainfall is common on and near the main west coast. Collingwood County has the heaviest (in the Bainham district it approaches 150in. a year), while Takaka has about 70in. Waimea, lying open only to the north, has the lowest, from 38in. near the coast to approximately 70in. at Murchison. The higher rainfall of the Collingwood, Takaka, and Murchison Counties fits them best for pastoral farming, where-

as the drier Waimea County combines arable and mixed farming with grazing. In the early season the Waimea County is prone to land winds and dry summers are not uncommon.

Cawthron Institute

Through the philanthropy of Thomas Cawthron, an old Nelson resident who bequeathed nearly all of his estate of £240,000 for the purpose of scientific research in primary industry, Nelson has been fortunate in having there the Cawthron Institute, now in its 26th year. The institute's research on soils, mineral deficiencies, and the control of fungus diseases and insect pests is known throughout the Dominion and the scientific world. The institute is staffed by some of the most able scientific personnel in New Zealand. The present director is Sir Theodore Rigg.

Nelson's primary industry has reached its present peak of success

guided by the institute's local studies of soils and fertiliser reaction, plant and mineral deficiencies, insect problems of farm, orchard, and timber, and studies of fungus diseases affecting fruit, hops, tobacco, and market-garden crops.

Also the institute has a close liaison with Government research activities in Nelson. The Entomology Division of the Department of Scientific and Industrial Research, under Dr. D. Miller and Mr. J. Muggeridge, has headquarters at the institute, while the Tobacco Research Station under the same Department and with Mr. R. Thompson as director is located at Riwaka, near Motueka. The Department of Scientific and Industrial Research has also established the research orchard at Appleby where manurial and spray programmes for the Moutere Hills orchards are the subject of close investigation. In all,

NELSON'S PRIMARY INDUSTRIES FOUNDED ON RESEARCH



ENTOMOLOGICAL SECTION, CAWTHRON INSTITUTE

The present peak of success of Nelson's primary industry has been reached under the guidance of the Cawthron Institute's 26 years of local studies of soils and fertiliser reaction, plant and mineral deficiencies, insect problems of farm, orchard, and timber, and studies of fungus diseases of fruit, hop, tobacco, and market-garden crops. The researches of the institute's scientific personnel are known throughout the world. Inset: The institute's founder, Thomas Cawthron.



FELLWORTH BUILDING, CAWTHRON INSTITUTE.

FARMING IN NELSON PROVINCE



[V. O. Browne photo.]

Motueka, chief town of Waimea County and subsidiary port, is the centre of Nelson's orchard and tobacco industry. The Motueka River is in the background.

Nelson is well provided for in primary industrial research.

Communications

Apart from access by sea, the Nelson Province, with its mountainous approaches, is relatively isolated from other South Island centres, a fact which is reflected in high freights, particularly for goods taken by road or via the short uncompleted railway which terminates 60 miles inland from Nelson at Glenhope. Facilities in the Collingwood and Takaka Counties are suitable for only light coastal shipping. In the Waimea County Motueka and Mapua are subsidiary feeder ports from which several hundred thousand cases of apples go by coastal vessels for final overseas loading at Wellington or for marketing elsewhere in New Zealand. The port of Nelson, with its greater depth of water, is capable of accommodating vessels of up to 11,000 tons and has been freely used as a direct overseas-loading terminal. The

tidal rise and fall at Nelson in spring is nearly 17ft.

From Nelson a daily summer and tri-weekly winter steamer service operates to Wellington. Airlines cope with considerable inter-island traffic and the air may be used more extensively in future to freight to the cities early produce that is perishable and highly priced.

Nelson's internal highways are good, linking to Marlborough, to Canterbury, via the Lewis Pass, and to the West Coast through Murchison and the Buller Gorge or by the Lewis Pass. Takaka and Collingwood Counties are, however, somewhat isolated geographically, and the Pikikiruna Range or Takaka Hill has to be crossed to reach Takaka. The road rises to 2600ft. and, although it is well surfaced, overland transport to Golden Bay is more costly than by sea.

Counties' Farming

The table on the right sets out the areas grazed in Takaka, Collingwood, and Murchison and gives the stocking of these counties on 1943-44 figures.

Grassland farming is the rule in these three counties and dairying is confined to river valleys and flats which, though of high fertility, are not extensive. Each county has its butter factory, and the butter, together with that from Waimea, is sold by an amalgamated company. The total output of the four factories was 2606 tons of butter for the 1944-45 season.

The back country of the Takaka, Collingwood, and Murchison Counties is mountainous; much is still in native bush, but where it has been cleared it

	Takaka	Collingwood	Murchison
	acres	acres	acres
Total area occupied	83,000	148,000	173,000
Sown grasses	38,000	30,000	58,000
	No.	No.	No.
Total cattle	10,000	7,300	9,700
Milking cows	5,700	3,000	3,500
Sheep shorn	46,900	27,100	45,400
Lambs tailed	18,900	11,000	23,400
Pigs	3,500	1,600	1,800
Dairy cows per 100 sheep shorn	12.1	10.9	7.6

Photographs on opposite page by courtesy of the Cawthron Institute.

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4-40-4

is mainly suitable only for cattle and sheep grazing. In Takaka and Collingwood particularly there are also considerable areas of naturally-waterlogged pakahi land, the development of which is regarded as unsatisfactory except for small areas which can be farmed along with other free-draining soils. The crops grown and grass saved for hay in these three counties are shown in the following table taken from the 1943-44 statistical abstract:

	Takaka	Collingwood	Murchison
	acres	acres	acres
Swedes	Nil	30	215
Turnips	Nil	43	378
Other greenfeed, including rape, choulmoellier, etc.	Nil	4	71
Hay or silage	2,024	581	1,537

The figures record that turnips and swedes are more extensively grown in Murchison than elsewhere. Hay and silage are the main supplements to pasture. Feeding out usually starts early in June, though with an extended autumn flush this season feeding out has been later.

At present there are 5 lime-crushing works in the Waimea County, one in Murchison, two in Takaka, and one in Collingwood. Nelson has large deposits of high-grade marble, and agricultural lime varies from 94 to 100 per cent. calcium carbonate. The ruling price for lime is about 21/- a ton at the works, though cartage costs are often heavy, especially to some back-block areas where they amount to half or more of the value of the lime. Superphosphate is the most widely-used fertiliser for topdressing in Nelson and sells at £6/1/- a ton, net, ex store, Nelson. Unfortunately the railway serves only a very limited area of Waimea County and as motor transport is expensive this undoubtedly has adversely affected topdressing.

Farming in Waimea

As early settlement was about the present site of the city of Nelson, the Waimea Plain and flats about Motueka were the first land to be brought into production. Waimea County includes the Waimea Plain and the rural land of Motueka and Riwaka and then runs inland for about 60 miles to near Glenhope, the rail terminal. The county is flanked on either side by mountains and has an area of a little over 1500 square miles. The really good land is estimated to be no more than 75,000 acres which lies along the river valleys about Motueka and Riwaka and includes the Waimea Plain. Between the Plain and Motueka, which is 35 miles by road from Nelson, is a belt of low hills stretching for some 60 miles inland. Seen from a distance their ridges take the form of a low plateau and they are commonly known as the Moutere Hills.

Nelson's apple orchards are situated on the costal slopes of these hills, much of the country being cleared

MIXED FARMING IN WAIMEA COUNTY



[Ellis Dudgeon photo.]

This holding in Motueka is typical of the mixed farming in the district. There is a raspberry plantation in the foreground, hops near the house, and fruit trees in the background.

from beech forest. Although apparently of alluvial origin, as the topsoil frequently overlies water-worn gravels, Moutere land is of low fertility. Physically the composition is a clay or silt clay, low in organic content and easily caking down to a hard surface. Chemically this soil type has a low phosphate and nitrogen status and requires lime. Boron is necessary on the orchard lands to prevent corky pit in apples and is necessary also for healthy swede and mangold crops. Magnesium, in the form of dolomite or magnesite, is commonly applied by orchardists to prevent leaf russetting.

About 50,000 acres have been re-afforested mainly with *Pinus radiata*, commonly known as the insignis pine. About half this area lies in the State Forest Service's plantation at Golden Downs. The remainder is mainly in scattered blocks nearer the coast and has been planted by commercial companies and other private interests.

Mr. L. E. H. Baigent, a prominent Nelson timber miller, has estimated that up to 250,000 acres of Moutere-class country is suitable for reafforestation. He states that the rate of growth of pines in this district is exceptionally high with natural regeneration greater than elsewhere in New Zealand. Trees in plantations are being milled at the age of between 18 and 25 years and, apart from building purposes, the Nelson fruit industry is entirely dependent on pinus timber for cases. That increased reafforestation is desirable is recognised also by the State Forest Service, which is acquiring additional land for planting. The Nelson Catchment Board, too, is vitally interested in the future of these hills and an aerial survey has recently been made of the major area, both to study the position and as a prelude to more

intensive conservation. Mistakes in the past century in clearing large tracts of low-fertility hill country are now generally realised, and ahead lies the task of planting trees where they are most suitable, retaining for farming such lower slopes, valleys, and terraces which will carry pasture.

This ideal, while apparently simple, is a good deal more difficult of fulfilment, as farming in the Waimea County is very mixed. The district is the sole producer of tobacco leaf in the Dominion and for many years has supplied all the hops for brewing in New Zealand. Because of the extent of hill country of low carrying capacity, pastoral farming is commonly combined with the cultivation of tobacco, raspberries, and hops on the more fertile flats. These crops bring in high returns an acre and give full employment to family labour. Dairying, though individually on a small scale, is also carried on in the river valleys.

As it has been more profitable to work the better land, little has been done in the way of pasture improvement over the main Moutere Hills area, thousands of acres having reverted to scrub and secondary growth. Where the country has been kept clean by burning off, etc., the grasses are mainly native species, danthonia, and browntop, the carrying capacity frequently being less than one sheep an acre. However, the position is not entirely beyond redemption as experience has shown that parts of this country will carry reasonably good pastures of ryegrass, cocksfoot, and clovers, if given adequate liming and topdressing. Grasses and clovers of Certified origin are, however, imperative with heavy dressings of ground lime and superphosphate dressings of up to 3cwt. annually.

DIVERSIFIED FARMING IN WAIMEA COUNTY

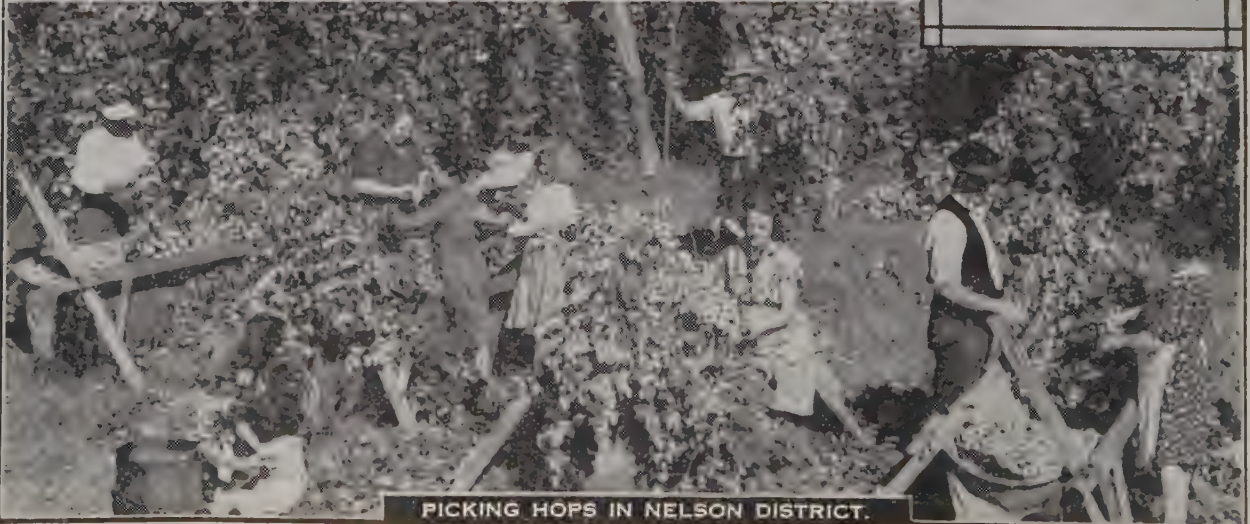


COASTAL ORCHARD ON MOUTERE HILLS.



TOBACCO STICKS BEING TIED AND ARRANGED FOR KILN DRYING.

There is a marked diversity of farming in Waimea County. Soil and climate favour the production of high-grade hops, and 621 acres were under this crop in 1946, yields averaging 1600lb. an acre. About 3500 acres of tobacco are at present grown, and soil surveys have revealed the suitability for the crop of about another 6000 acres. Manufacturers have established drying floors and leaf-conditioning factories and there is a Tobacco Research Station at Riwaka.



PICKING HOPS IN NELSON DISTRICT.

FARMING IN WAIMEA COUNTY



[V. O. Browne photo.]

Land bordering Tasman Bay is particularly suitable for fruit growing and this aerial view looking toward Nelson shows how intensively the Tasman district is planted in fruit trees.

In one instance on a foothill farm bordering the plain Moutere soil has been improved to carry 4 to 5 sheep an acre and the farm income is being supplemented by harvesting ryegrass for seed. The saving of seed has been done on other properties of this soil type also. Therefore it seems probable that more of the easily-ploughable foothills and also the terraces in the Motupiko and Tadmor districts are capable of improvement.

The problem is to some extent a domestic one, as tobacco growing has now extended into nearly all the valleys and, along with the growing of raspberries and hops, mixed farming is often financially more attractive than the regressing of hill country where the costs are considerable and the climate often unkind.

The Waimea Plain is of alluvial origin. It is a relatively small plain of diverse soil types, including shingle loams, and in the main is not ideally suited to pasture, as in many parts these soils dry out rather badly in summer. Wheat, oats, and barley are

staple crops. Peas are grown for canning and seed. Lucerne and cowgrass are used increasingly and extensively for hay and feeding. The following table shows how the land in Waimea County is farmed:—

TABLE I—LAND UTILISATION IN WAIMEA COUNTY (1943-44 data)

	acres
Total area of county	984,000
Land occupied for farming	577,000
Improved farmland	149,500*
Unimproved farmland	377,500
Mountainous land in forest, scrub, etc., and unsuitable for farming	407,000

* Plus 50,000 acres reafforested.

Of a total area of 984,000 acres only one-fifth, or 199,500 acres, has been improved. The improved area is estimated to produce over 90 per cent. of the county's agricultural return, leaving less than 10 per cent. to be won from the remaining 377,500 acres of occupied land.

The greater part of this vast unimproved area is covered with fern, scrub and second growth, native grasses, and bush. About 100,000 acres are probably in rubbish and native grasses. Over much of these low-fertility hills heath is spreading rapidly among the flora, scrub, fern, and gorse. In Nelson gorse is looked on with some

favour for sheep grazing, but heath is quite useless.

TABLE II—USE OF IMPROVED FARMLAND IN WAIMEA COUNTY (1943-44 data)

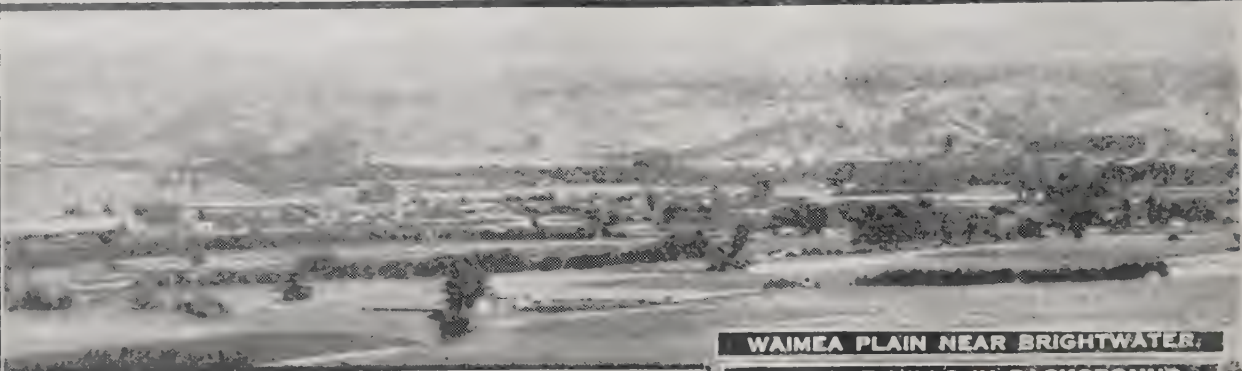
	acres
Sown grasses	127,000
All crops (grain, seed, and feeding)	13,000
*Orchards	4,000
*Tobacco	3,500
*Hops	620
*Market gardens (inclusive of peas for canning, tomatoes, and vegetables generally)	1,100
*Raspberries and small fruits	250
Total	149,470
Reafforestation (including 24,000 acres State planted)	50,000
Grand total	199,470

* 1945-46 data from current registrations.

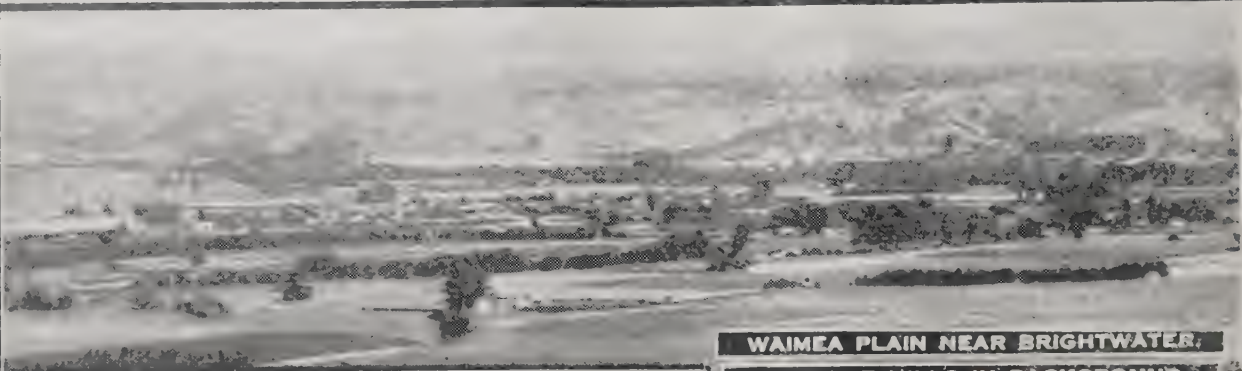
That considerable areas of poor land are going out of production is indicated by the decrease in the total occupied acreage in recent years. On the other hand the better land is being more intensively developed and cropped. Before the Second World War there was a yearly increase in the use of lime and topdressing, and local merchants state that now 75 per cent. or more of grass seed sold is of Certified origin.

Top and middle photographs on opposite page by A. R. Kingsford; bottom by Ellis Dudgeon.

FARMING ON NELSON'S VARIED SOIL TYPES



Of the 984,000 acres of Waimea County only about 75,000 acres along the river valleys is really good land, yet the district is the sole producer of tobacco leaf in the Dominion, and for years it has supplied all the hops for brewing in New Zealand. On the poorer lands of the Moutere Hills most of the 1,115,000 bushels of fruit produced annually in Nelson is grown, and the slopes are suitable for re-afforestation.



WAIMEA PLAIN NEAR BRIGHTWATER.

MOUTERE HILLS IN BACKGROUND.



HILLSIDE PLOUGHING FOR EARLY CROPPING.



FERTILE RIVER FLATS OF RIWAKA AND MOTUEKA.

FARMING IN WAIMEA COUNTY

TABLE III—USE OF CROPPING LAND IN WAIMEA COUNTY (1943-44 data)

Oats:	Acres.	Total
Threshing	212	
Chaff, hay, or silage ..	1,880	
Not harvested (fed off) ..	1,449	
		3,541
Barley:		
Threshing	1,491	
Fed off, etc.	122	
		1,613
Wheat:		
Threshing	538	
Other purposes	23	
		561
Grass and Clover for Seed:		
Ryegrass	171	
Cowgrass	152	
Cocksfoot	3	
White Clover	34	
Other seed	1	
		361
Potatoes		589
Peas listed as for seed ..		1,134
Green peas for cannery (estimated)		400
Root and Forage Crops:		
Turnips	2,872	
Turnips and rape	66	
Swedes	613	
Rape	939	
Mangolds	17	
Other green fodder	211	
		4,718
Linseed and other crops for threshing		66
		12,983

Departmental records for 1945-46 show a decline in the area cropped to wheat to 391 acres and of oats for threshing to 200 acres. Offsetting these decreases, land under seed barley (Australian Chevalier) has steadily increased, as has also the acreage of green peas grown for canning, which is now 400 to 500 acres annually. Allied to this, Nelson's wheat acreage, which at best was only 2000 acres, was produced by many growers averaging only about 10 acres each.

There is no extensive wheat land in Nelson, and quick-maturing barley is a less hazardous and more remunerative crop. The decline in oat acreage has also been considerable, coinciding with the replacement of horses by power machinery. Turnips, 3000 acres, are the main root crop grown in the Waimea County.

The pastoral and stock position is detailed in table IV:—

TABLE IV—PASTORAL & STOCK POSITION WAIMEA COUNTY (1943-44 data)

	Acres.
Unimproved farmland	377,500
Sown grasses	127,318
Lucerne cut for hay or seed ..	977
Grasses and clovers cut for hay ..	4,674
Silage	72
	No.
Total cattle	23,500
Milking cows	9,500
Sheep shorn	253,500
Lambs tailed	108,700
Pigs	4,800
Dairy cows per hundred sheep shorn ..	3.8

The low ratio of cows to sheep in the Waimea County is accounted for by the drier climate and extent of poor hill country. Cream for butter-making is drawn by the factories from many small suppliers. In the 1945-46 season the Waimea factory produced 896 tons of butter from 863 suppliers.

Top and middle photographs on opposite page by Ellis Dudgeon.



[Ellis Dudgeon photo.]

Mixed farming in the Orinoco Valley. Tobacco and raspberries are growing on the flat near the homestead and the hills are used for grazing sheep.

Nevertheless dairying has considerably increased in the past 20 years, as has also the town milk supply to Nelson (including Tahunanui), 16,552 persons, Motueka, 1909 persons, Wakefield, and other small neighbouring centres. (Population figures are from the September, 1945 Census.) In fact, milk from dairy farms on the heavier ground of the lower Waimea Plain near Richmond and Stoke, and at Wakapuaka, is almost wholly for town milk supply.

An aspect of Nelson farming is early cropping, which was described in the issue of August, 1945, of the "New Zealand Journal of Agriculture." Green peas from Nelson are available in commercial supply, except in mid-winter, and in the foothill country near Richmond early potatoes are dug from June onward.

Future Prospects

A general survey of the province shows that there is undoubtedly much land where production could be increased by renovating or resowing worn-out pastures with proven strains. By doing this, liming and topdressing would become more remunerative still.

An excellent example of the value of introducing subterranean clover is to be found on Mr. D. Win's property along the banks of the Buller River, at the Owen River junction, near Murchison. There is a place for this clover on shingle land in all of the counties.

Now that seed-dressing facilities are available in Nelson there is opportunity, especially with the lower rain-

fall of Waimea County, for an increase in the growing of quality small seeds carrying Government Certification. Results have shown ryegrass and clovers already "Certified" to be of a generally high germinating capacity and of the highest market value.

On much poor land, notably of the Moutere class in the Waimea County, extensive reafforestation commends itself. The Nelson Catchment Board is actively interested in erosion and fire control; land which at present is too steep to farm must be permitted to regenerate naturally under Government or local body authority, and planting must be done to prevent detritus, boulders, and shingle from choking the numerous rivers and making the harbours and sea bed shallow.

Nelson's admirable climate should be exploited to the full. The district is renowned for its market crops (fruit, tobacco, hops, tomatoes, and early produce), and as these are the principal source of income, they justify the most intensive development.

HORTICULTURAL INDUSTRIES.

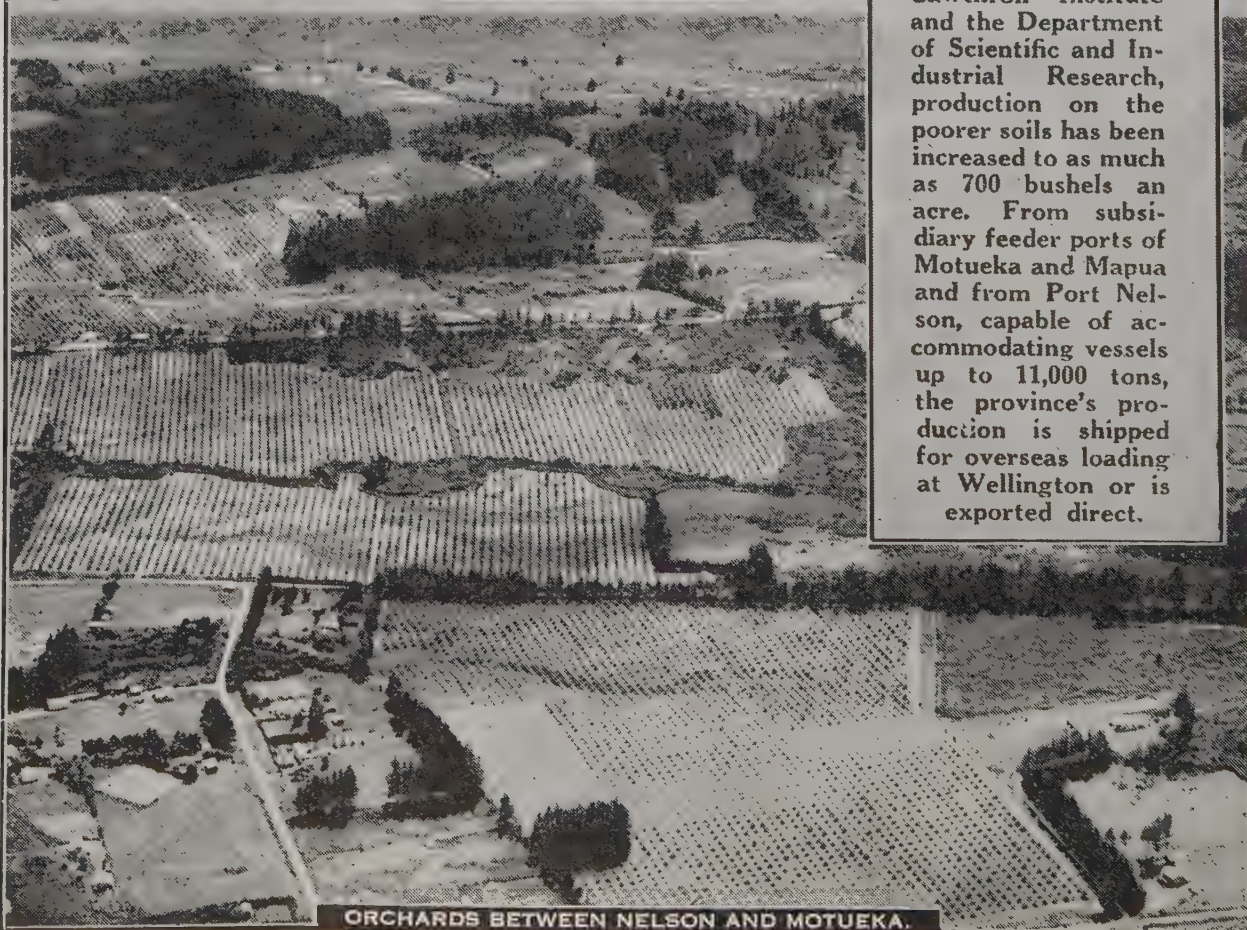
The Waimea County of the Nelson Province is in a unique position agriculturally, as it is the centre in New Zealand of commercial hops and tobacco growing, as well as holding a leading position as a fruit-growing district. Tomatoes, small fruits, and canning crops are also grown extensively in the county and contribute largely to the value of the province as a primary producer.

Climate is a most important factor in the successful conduct of these in-

FRUIT INDUSTRY IN NELSON



DIRECT LOADING OF APPLES FOR BRITAIN FROM NELSON.



ORCHARDS BETWEEN NELSON AND MOTUEKA.

The fruit-growing industry assumed major proportions after the suitability of the Moutere Hills was discovered by orchardists in 1911. In 1946 there were 3922 acres in orchards. As the result of the manurial investigations by the Cawthron Institute and the Department of Scientific and Industrial Research, production on the poorer soils has been increased to as much as 700 bushels an acre. From subsidiary feeder ports of Motueka and Mapua and from Port Nelson, capable of accommodating vessels up to 11,000 tons, the province's production is shipped for overseas loading at Wellington or is exported direct.

dustries. The sheltered position of the Waimea County, together with the high proportion of sunshine and the satisfactory rainfall fairly well distributed, makes for very favourable conditions for cultivating fruit, tobacco, hops, tomatoes, and market-garden crops. The suitable climate is associated with the occurrence of soil types of the right texture and mineral composition for growing high-grade tobacco leaf.

The development of some of these horticultural industries has brought about the intensive farming of land otherwise regarded as of low agricultural value. This applies particularly to tobacco growing in the Motueka-Riwaka districts and the Motueka Valley, where, of the variable soil types, sands and sandy loams have been selected to produce tobacco, leaving the more fertile land for fruit, hops, and grazing. It also applies to the apple industry established on the Moutere Hills country.

Fruit Industry

Fruit growing has been undertaken commercially in the Nelson Province for years, but it assumed major proportions in 1911, following the extensive planting of apple trees to produce for export, when the Moutere Hills came into prominence as potential lands for this purpose. Large areas were taken up by syndicates and subdivided and sold for apple growing, arrangements being made for planting, maintenance, and supervision for absentee owners during the period of development.

Plantings were made mainly between the years 1911 and 1916, when, owing to the war, further extensive planting was stopped. The impetus given to planting through the opening up of the Moutere Hills lands in those years extended to the older settled and recognised fruit areas of Stoke and Riwaka. It is from the plantings in those years that the main apple production is now derived, and is likely to continue for some time. Incidental to apple planting pears were planted in a more limited way and confined to the heavier flats where apples were not so likely to succeed on account of wet conditions, while some larger pear blocks were planted in Stoke and Riwaka on more fertile land.

Before the expansion in orchard planting of 1911-1916 commercial orchards were more of a mixed type and the cultivation of stone fruit ranked as high in importance as pip-fruit growing, but over the past 30 years apple production has been the main consideration. Stone fruit has not been produced on a scale large enough to leave any substantial surplus for consignment out of the province after meeting local factory and market requirements, but an improved

NELSON'S FRUIT INDUSTRY



[Ellis Dudgeon photo.]

Considerable areas of tomatoes are grown out of doors in the Waimea district for sale and for the preserving factory.

demand for it with satisfactory returns has stimulated planting.

Some 45 to 50 years ago orchards were mainly of the semi-commercial type carried on as an adjunct to small mixed farms. Stone fruits apparently succeeded best as, with limited knowledge in disease control at that period, apples and pears were difficult to grow because of black spot and codling moth, while stone fruit, particularly European plums, were not so affected by disease. Plums and apricots were available for local needs and for supply to the first jam and preserving factory established in Nelson, and also for shipment to Wellington. Supplies came mainly from Wakapuaka, Stoke, Brightwater, Motueka, and Riwaka.

The distribution of the total registered orchard area at the beginning of 1946 is set out in Table V.

TABLE V—DISTRIBUTION OF ORCHARDS IN THE NELSON PROVINCE

	Acres
Moutere Hills	2,517
Motuoka-Riwaka	432
Lower Moutere-Braeburn ..	327
Stoke-Richmond-Tahuna ..	347
Brightwater-Waimea	147
Spring Grove	43
Wakefield	34
Hope	57
Appleby	18
Total	3,922

Table VI gives the approximate area under each kind of fruit and average production in the province.

TABLE VI—AREA UNDER EACH KIND OF FRUIT GROWN COMMERCIALY AND AVERAGE PRODUCTION.

	Acres	Bushels
Apples	3,254	975,000
Pears	280	85,000
Quinces	40	7,500
Peaches and nectarines ..	275	40,000
Cherries	6	650
Apricots	5	250
Plums	47½	6,000
Lemons	14½	800
Total	3,922	1,115,200

On the Moutere Hills, where almost 65 per cent. of the orchard area is located, fruit production is almost confined to apples and pears; thus it is inevitable that the apple industry of Nelson must be regarded as practically belonging to that area, so that some reference to the development of these orchards and the area called the apple lands is of interest.

When orchard planting began the Moutere Hills were covered with stunted manuka and fern and were regarded as of little value for agriculture. There was evidence of fire having covered the district at intervals, the scrub being taller in gullies and parts missed by fires. The method of breaking in the country was by scrub-cutting by hand, by burning, and by grubbing the occasional large stumps, and ploughing with horse-drawn ploughs of the short-mouldboard type. Ploughing was done in the autumn and winter when the land was sufficiently moist to permit of deep cultivation, being followed by discing and harrowing in preparation for planting, which often followed immediately. On such raw country, which lacked organic matter and which was in such poor physical condition when planted, it was surprising that the trees made the fair progress they did in the earlier years.

Through lack of knowledge of soil requirements, and often through lack of finance to purchase lime, fertiliser, and seed for cover crops, the settlers did not witness the rapid tree growth now obtained by applying the experience and knowledge gained over the past 30 to 35 years. The industry faced many problems in the earlier period of its development, but the most vital one was the relatively poor growth on the soils of the Moutere Hills.

Manurial treatment of these orchards was one of the first studies



BURN MORE TO EARN MORE THE "DRAGON" FLAME THROWER

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made by the Cawthron Institute on behalf of the fruit growers, and it was quickly shown that the soil was highly deficient in lime, phosphate, organic matter, and nitrogen, and that a manurial programme must take account of all these deficiencies. Applications of lime at the rate of 1 ton to the acre, the liberal use of phosphate, and the regular culture of cover crops for ploughing in were the basis of original recommendations. Experiments showed the success of blue lupin as a cover crop. Long-term manurial experiments were made by the Cawthron Institute at Upper Moutere and at the Cawthron orchard at Annesbrook. The necessity of increasing the nitrogen supply to the fruit trees on the Moutere Hills was demonstrated and also the importance of potash when the trees came into bearing. The turning point for many orchards came about the years 1922-23 when the Government provided a sum of £5000 for short-term loans for the purchase of lime, fertiliser, and seed for cover crops to carry out a manurial programme on the basis of the institute's recommendations.

The experimental plots at Upper Moutere proved particularly valuable in guiding the manurial programmes of orchardists and in providing a basis for more detailed experiments by the Department of Scientific and Industrial Research at the research orchard, Appleby. Work at Upper Moutere has clearly shown the importance of a complete fertiliser for the treatment of Moutere Hills orchards and, as a result of manurial experiments, it has been possible to recommend for average orchards an annual dressing of 3lb. superphosphate, 1lb. muriate or sulphate of potash, and 2lb. of dried blood or sulphate of ammonia for each tree.

Generally, the treatment of orchards now consists of a complete fertiliser application with occasional liming and sowing of cover crops for ploughing or discing in. Clean cultivation is carried out from the spring until the end of January, when blue lupins are usually sown as a cover crop.

Further problems of boron and magnesium deficiency were later encountered but were overcome as the result of investigations by the Department of Scientific and Industrial Research and the Cawthron Institute. Major difficulties of manurial treatment and disease control too have been smoothed out by research carried out by the Plant Diseases Division and the Cawthron Institute, until most of the orchards are on a very satisfactory standard of production.

The planted area in the province reached a peak of some 8000 acres, mostly as a result of extensive planting of the Moutere Hills, but large blocks were cut out owing to difficulties of maintenance and failure through planting unsuitable areas. Orchards

FRUIT AND HOPS IN NELSON



[A. R. Kingsford photo.]

The picking of raspberries is responsible for a large seasonal labour demand in Nelson.

located on the better slopes, and given satisfactory treatment, have done extremely well, comparing favourably with other Nelson orchards, the yields in a number of instances reaching between 400 and 500 bushels an acre, with some well-situated orchards under capable management reaching between 600 and 700 bushels an acre in good seasons.

The industry is usefully served by having the Research Orchard at Appleby on Moutere Hills soil type and the Cawthron orchard at Annesbrook, where some useful fruit tree stock trials have been made. Any extension of orchard planting could be undertaken with the advantage of knowledge gained concerning suitable land, manurial treatment, varieties, and stock. On the Moutere Hills a more vigorous stock than Northern Spy, which was used almost entirely on earlier plantings, would give better results. With the use of such stocks orchard extension on the Moutere Hills could be undertaken with complete confidence.

Notwithstanding all the difficulties experienced with earlier plantings, the 2500 acres retained on the Moutere Hills are being maintained at a satisfactory level of production, and while the total

area under orchard has been declining until recently, production is fairly stable and is even showing signs of rising with improved management.

Commercial hop culture in New Zealand is an industry peculiar to the Waimea County and is one of Nelson's earliest industries. Conditions of soil and climate have proved most suitable for the production of high-grade hops. The climate is probably the more important factor, the requirements being an adequate rainfall of 30 to 40in. a year, with relatively high summer temperatures and hot, dry conditions for harvesting. Absence of high winds is also important, as vines are trained to an overhead wire trellis system. Hops will thrive on any good alluvial soil, but do best on very friable soils of a light, loamy texture of good depth and good natural drainage. All these conditions are experienced in the Waimea County.

Early settlers brought Kentish sets with them and almost from the foundation of the settlement hops have been grown. For many years Nelson has supplied all the hops used in the breweries of New Zealand as well as at times having a surplus for export to Australia, South Africa, and Britain.



MORE WORK

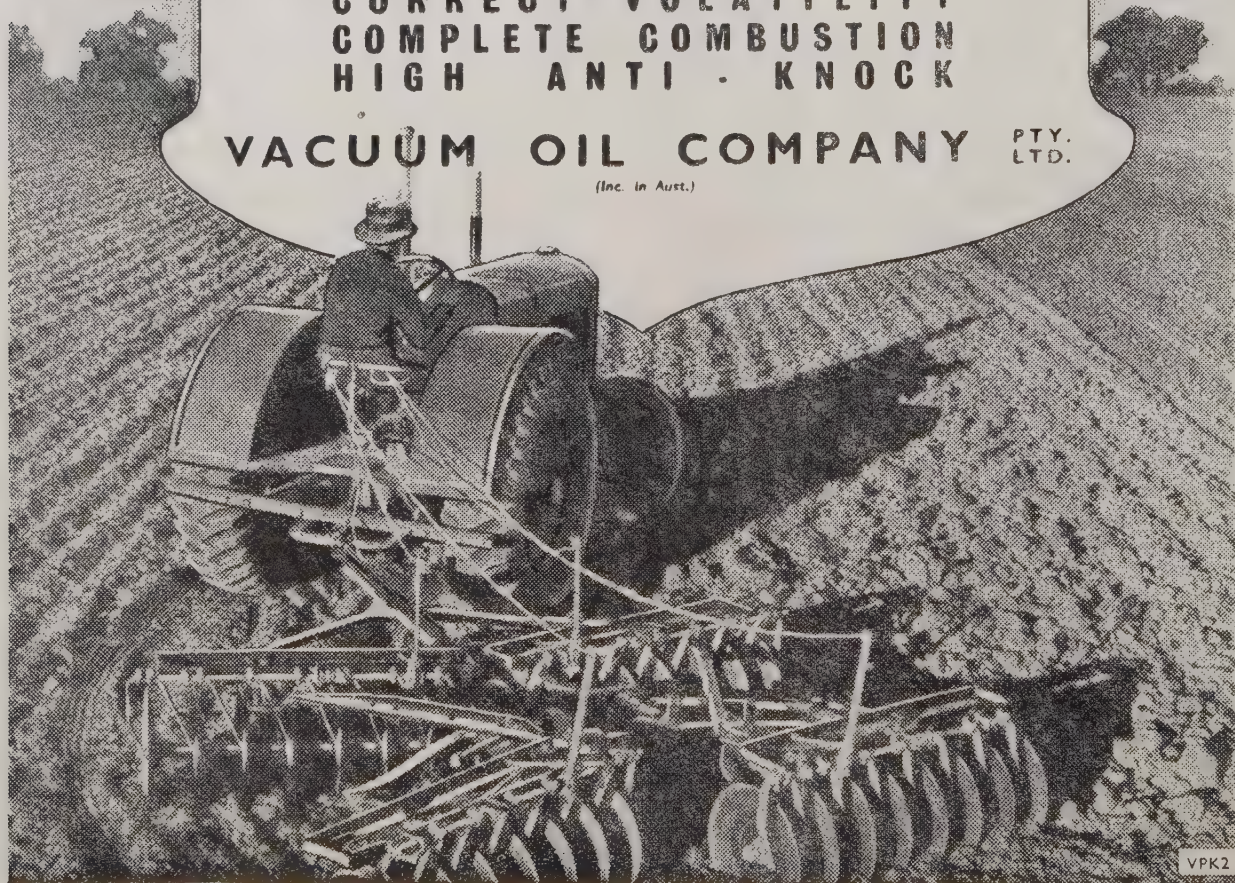
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NELSON'S TOBACCO AND SMALL FRUITS

Although the hop industry has remained fairly stationary over a number of years, it could be expanded if at any time it was thought desirable, as there are considerable areas of alluvial soils well suited to hop culture. The demand from overseas markets will be the determining factor in further expansion. Hop gardens are located chiefly in the Motueka-Riwaka, Upper Moutere, and Waimea districts, while there are scattered gardens in the Tadmor, Sherry River, and Motueka Valley areas.

In 1907 the area under hops reached a peak figure of 984 acres, but since then the acreage has declined until in 1945 there were only 570 acres. With a strong demand for hops by New Zealand users and overseas markets providing a good outlet for surplus production, extensions to existing gardens and the establishment of new ones are being encouraged, as a result of which the hop area increased by 51 acres in 1946 with further expansion contemplated.

Gardens vary greatly in size, but the majority are small. They are numerous, however, as no fewer than 142 growers were producing hops on a total of 621 acres in 1946. Hop growing is usually carried on in conjunction with some other farming activity, adding to the diversity of the general farming carried out in the Waimea County. Hops are often grown in association with fruit, tobacco, small-fruit culture, dairying, and sheep farming. The average production an acre is about 1600lb. of cured hops, but yields of over 2000lb. an acre are obtained from the better gardens in good seasons.

An account of the hop industry in Nelson was published in the issue of February, 1946, of the "New Zealand Journal of Agriculture," wherein cultural methods were discussed.

Tobacco Growing

Growing tobacco leaf on a commercial scale and its manufacture are comparatively new industries in New Zealand. The whole of the commercial tobacco crop is now produced in the Waimea County of the Nelson Province where the particular soil types and general climate have proved ideal for high-grade leaf.

Climatic conditions for tobacco are relatively high summer temperatures, a rainfall of at least 35in. a year, with good rains in November, December, and January, and an absence of high winds and hailstorms during the growing months, November to March inclusive. The Nelson Province measures up to these conditions very satisfactorily.

Sands and sandy loams only can be considered for the flue-cured variety, but for Burley, the air-dried type of which comparatively small quantities



A Tasman apple orchard in various stages of establishment.

are grown, medium loams are suitable. An intensive soil survey of the Nelson district has been carried out by the Cawthron Institute and detailed soil maps prepared for most of the commercial tobacco-growing areas. Tobacco growing has been confined almost entirely to those soil types suitable for the production of high-quality flue-cured leaf. At present approximately 3500 acres of tobacco are grown in the Waimea County, the more important districts being Motueka, Riwaka, Motueka Valley, Dove-dale, and Ngatimoti. Soil surveys completed to date reveal another 3500 acres of soil in groups 1 and 2 (described below) which might be available for the extension of the flue-cured tobacco industry, with another 2700 acres of soil of group 3 which might possibly be used for tobacco culture.

Description of Soil Types

- GROUP 1:** Fine sands, sandy loams, and sand loams on fine sand. Depth at least 18in.—the most desirable type.
- GROUP 2:** Texture very similar to No. 1, but not as deep. Depth 12in. to 18in.—very suitable.
- GROUP 3:** Texture suitable, but liable to either flood or drought—possibly with gravel underneath and suitable if irrigation provided.

Interest in the commercial production of tobacco leaf in Nelson was first shown about 1916, when, aided by knowledge gained from the United States, tobacco growers soon made good progress. The success attained by Nelson growers and the suitability of the climate and much of the land led manufacturers ultimately to concentrate all contracts with growers in this province.

Since the outbreak of war in 1939 the whole commercial tobacco

crop for New Zealand has been grown in the Nelson Province. The acreage grown and poundage sold in recent years shows an upward trend and is likely to increase still further as labour and materials become more readily available. Production for the past seven years is shown in Table VII:—

TABLE VII—PRODUCTION OF TOBACCO AND POUNDAGE SOLD 1939-1946

Harvest Year	Acres	No. of Growers	Amount Sold, lb.
1939-40 ..	2,570	339	2,217,040
1940-41 ..	2,963	381	3,143,355
1941-42 ..	2,875	381	2,721,539
1942-43 ..	2,907	360	3,185,183
1943-44 ..	3,066	414	3,083,094
1944-45 ..	3,303	487	3,286,067
1945-46 ..	3,560	552	3,500,000 (estimate)

The industry is particularly well served by manufacturers who have their buying floors and leaf-conditioning factories in Motueka. The Tobacco Research Station, located at Umukuri, was established in 1937, since when many problems arising from the production and curing of tobacco leaf under local conditions have been dealt with successfully.

Tobacco is the sole crop of many growers, but for the majority of smaller growers it is undertaken together with some other form of production including hops, fruit, dairying, and sheep farming which add to the diversity of farming in the Waimea County.

Small-fruit Industry

Small fruits have been grown commercially in parts of the Waimea County for many years and the raspberry-growing industry reached fairly large dimensions at one time, but has shown a decline since 1920, when over

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400 acres were grown. However, with better prices offering and a much-increased demand, Nelson growers are extending their plantations as far as labour and materials will permit.

Raspberries have been cultivated mostly in Motueka, Ngatimoti, and Tadmor. The total area in small fruits amounts to 250 acres, of which 188 acres are in raspberries, a reduction in the area of small fruits being most marked in the Motueka-Riwaka district, where tobacco has very largely replaced small fruits. The Motupiko, Tadmor, and Sherry River districts have increased in importance in raspberry culture, as conditions there are excellent, though they are more risky for tobacco growing on account of a danger of early frosts. With the climate rather cooler, a higher rainfall, and the very friable silt loams, these lands are especially suited to raspberry culture. Yields in these areas are very satisfactory, upwards of 2 tons an acre being frequently harvested, with occasional well-established gardens producing as high as 3 to 4 tons an acre in good seasons. In these districts transport by rail is an advantage in handling raspberries from the garden to the factory.

The Todmor-Motupiko and Sherry Valleys are so well suited to small-fruit culture, especially raspberries and black currants, that extension in these districts is likely. Small-fruit culture is frequently undertaken as well as dairying and sheep farming on larger holdings, where often the more intensive cultivation of the suitable flats provides the major part of the annual income from such holdings.

Commercial Gardening

Apart from the production of a range of vegetables to meet normal local demand there has been developed in the Waimea County a commercial gardening industry mainly concerned with the production of tomatoes, both outdoor and under glass, early peas and potatoes, main crop peas, and broccoli for outside markets, and also canning crops, using in all about 1100 acres. Probably the greatest single influence in the development of Nelson as a commercial garden district has been the establishment of the canning industry. This has enabled farmers to plant crops with an assured market at a fixed price, its influence being seen in the large acreage devoted to tomatoes, peas, and beans.

The glasshouse tomato industry and the growing of early peas and potatoes are specialised forms of production which have developed independently of other forms of commercial vegetable growing and are the result of advantage being taken of specially favourable soils and climate in limited areas.

The greater part of the commercial gardening is confined to the Waimea

. . . COMMERCIAL GARDENING IN NELSON

Plains, while glasshouse tomato growing is centred round the city of Nelson. Owing to the extensive use of land for tobacco, hops, and small fruits, and the comparative isolation from markets of the alluvial plains of Riwaka and Motueka, they have not been taken to any extent for vegetable crops.

Early peas and potatoes are a special feature of commercial gardening in Nelson. These crops are grown mainly on what is known as the Heslington Belt, which lies along the foothills to the east of the Waimea Plains. The belt runs from Stoke southward to the Wairoa Gorge, near Wakefield, a distance of about 17 miles, and consists of a narrow strip of dark, free-working loam, varying in width from a few chains to one mile, being confined on the lower levels by the stony loam soils of the plains and on the uphill side by the clay loams of the foothills.

Apart from possessing a free-working, well-drained soil two to three feet in depth, the belt has the advantage of being much warmer than the plain below, night temperatures being 10 degrees to 12 degrees higher. The slopes face directly to the sun and the proximity to the coast causes air currents to move down the hill slopes after nightfall and set up a breeze to ward off frost. The slopes are often very steep and have to be cultivated by hand, but hillside ploughs are used on the easier slopes. Owing to the drying out of the soil during the summer, the belt is suitable for growing early vegetables only.

In this area pea sowing starts in February and extends through April. Following a mild autumn crops from the earlier sowings may mature before the end of June, when they are regarded as "lates," but usually picking begins after June, when the peas are regarded as true "earlyies." Early potato crops are planted from February onward and digging of the first earlyies starts in August and continues to December, by which time crops from later plantings on the flats are ready for the market. Up to 100 acres of both early peas and potatoes are grown on these steep slopes each year in a crop rotation.

The steeper slopes are usually resown to grass after one crop of peas. A common rotation is peas followed by rape, potatoes, rape, and then to grass or a second crop of potatoes. Continual breaking up of fresh land being necessary, the area available for early cropping is distinctly limited.

On the stony loams of Richmond, Hope, and Brightwater peas and broccoli are the main vegetable crops. Natural drainage is good, with the plain

rising to a height of 100ft. above sea level. In years of low summer rainfall this area is affected by drought early, while severe frosts make conditions unsuitable for growing early crops. In the fertile areas round Appleby peas are also grown extensively.

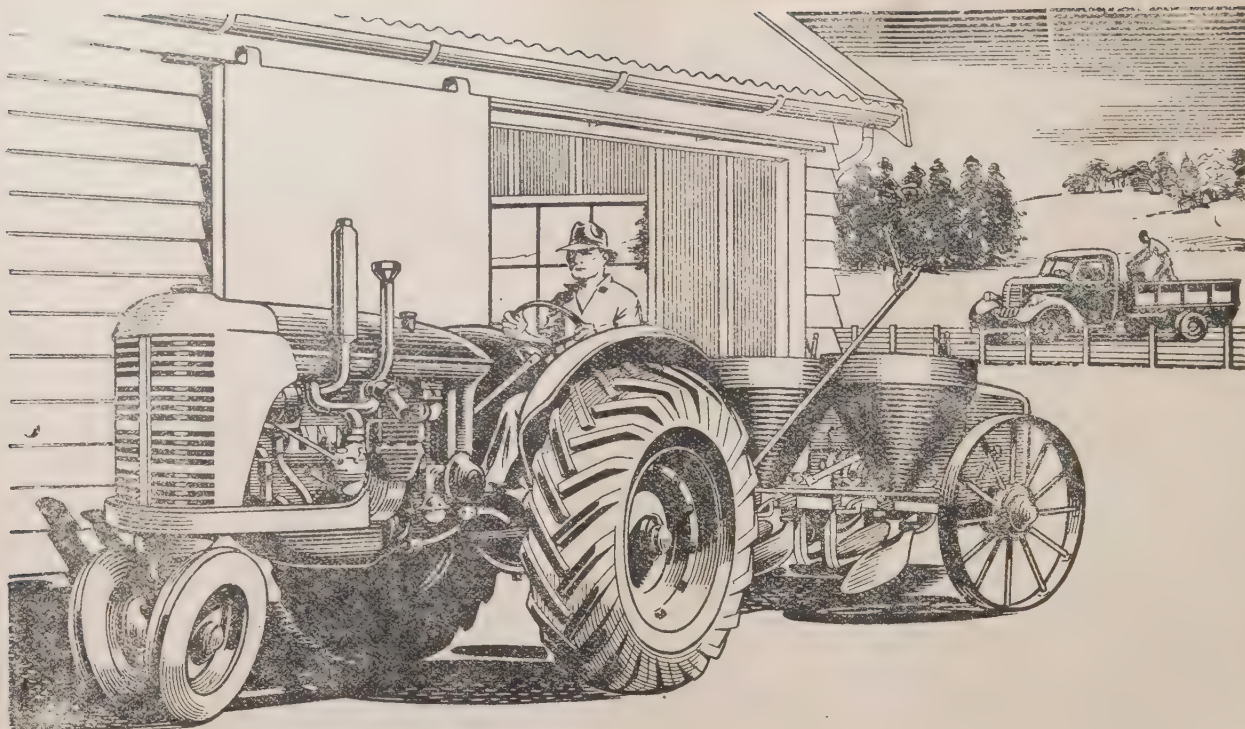
Peas are grown both for canning and for marketing outside the district, and some 500 acres of main crop peas are sown, including about 200 acres specially grown for the pea viner established by the canning factory. Of the balance which are hand picked, about half are marketed and the remainder processed.

Outdoor tomatoes are grown extensively in the more fertile areas round Appleby and on the foothills of Brightwater, where the bulk of the outdoor tomato crop is now produced. Tomatoes are also grown in smaller areas elsewhere, particularly in association with glasshouse culture in the Nelson City area. Outside plantings have reached a total of 200 acres in recent years. The demand for tomatoes, both for canning and in the markets, is excellent and Nelson growers, enjoying favourable conditions for the production of this crop, are able to consign their produce to markets as far south as Invercargill and to the Wellington Province.

Glasshouse tomato production is concentrated largely within the city of Nelson and mainly in the area which lies north of the Maitai River, known as "The Wood." Land here consists of an alluvial chocolate-coloured sandy loam which has proved excellent for tomatoes. It is a sheltered area, enjoying the maximum sunshine, with night temperatures relatively warm. The total area of glasshouses for tomato production in the city and outlying districts is 20 acres. Most of the houses are unheated, but produce heavy crops of early tomatoes which are marketed widely.

Many producers of vegetables and commercial garden crops are small farmers engaged in sheep, dairy, fruit, and mixed farming, and by growing such crops they are able to add to the scope of their farming pursuits to advantage.

Much seasonal labour is required by all these horticultural industries, especially for harvesting. The peak of the demand for labour for fruit, tobacco, hops, and tomatoes coincides, while at the same time the canning and fruit-processing factories are wanting full staffs. A tremendous call on labour results and all local resources are tapped. Fully half of the seasonal labour required, however, is recruited from outside the province, being drawn from all parts of the Dominion.



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FARM WORK FOR JUNE

CEREALS

DURING June final cultivation work for, and the drilling of, late-autumn-sown wheat on light to medium wheat land under Canterbury conditions may be carried on. However, no time should be lost, as experience has shown early sowing to be a sound practice in the main wheat districts.

For spring-sown cereals, wheat on heavier land, barley, and maize, every opportunity should be taken to prepare the ground for sowing. Soil turned up now will benefit from the action of winter frosts. Too often cultivation is left until the last minute, such a hurried preparation leaving the soil in poor condition for sowing, with a consequent decrease in the vigour of establishment and yield of the crop. On a well-run mixed cropping farm the farmer realises that he has to make the best use of all suitable weather for cultivation or harvesting. Particularly was this realised in Canterbury in 1945 and 1946 when abnormally high rainfalls in autumn and spring greatly reduced the period in which it was possible to do any cultivation work. The farmer growing only a small area of crop, perhaps by employing contract workers, is more prone to neglect to carry out adequate and timely cultivation. Skim or deep ploughing now, followed by a ploughing in the spring for maize, barley, and spring wheat, will give the best cropping results.

POTATOES

The main potato crop in the South Island is being dug in many districts. Every care should be taken in the handling of the crop, both in digging and in grading. In pitting potatoes care must be exercised not only in handling but also in seeing that there is sufficient protection from rain and frost. In districts where there are heavy frosts potatoes in sheds, whether bagged or not, require extra covering for full protection from the frost. If potatoes are to be left for any length of time in a shed, provision should also be made for sufficient ventilation.

Preparations for next season's potato crop should be started now, if not already done. A skim ploughing or hustling of the grassland should have been undertaken previously to be followed by a deep ploughing, leaving the land to lie during the winter before further work in the spring.

ROOT CROPS

The lifting or feeding off of root crops (turnips, swedes, chou moellier, mangolds, and carrots) will be occupying many farmers at this time. Roots may generally be classi-

By the Fields Division

fied as low fibre-containing and high water-containing foodstuffs which require a supplement of other fodder to balance them. The most suitable supplements with roots are oat-sheaf chaff, lucerne hay, or good-quality meadow hay; silage being also a watery and cold foodstuff is not altogether suitable. On dairy farms where roots are grown they are best pulled, or with chou moellier, cut, and fed to the dairy herd on dry pasture or other suitable paddocks. Mangolds must be fed with care and generally require pitting before feeding. They should be pulled in good time to allow them to ripen or mature before they are eventually fed. No roots, while still frosted, should be fed to stock. Usually from four to six weeks are required between the pulling and feeding out of mangolds.

On sheep farms chou moellier, swedes, and turnips are most frequently fed off in the paddock in "breaks." On swedes and turnips, hoggets or failing-mouthed ewes may be used to graze off the tops, being followed by sound-mouthed sheep. If oat-sheaf chaff or good hay is not being fed out in racks to the sheep, a run-off of mature pasture is desirable. After being fed off the shells of the turnips may be grubbed or harrowed out of the ground for clearing up, providing, of course, that the area has not been sown in conjunction with grass.

GRASSLAND WORK

Pasture renewal: Run-out pastures may be profitably ploughed up now and prepared for sowing either in crop or, as is the practice on some grassland farms, for resowing to pasture. Growing one or more crops after ploughing up old pasture has much to recommend it on an economic basis even on highly-priced grassland where cropping may not be a general practice. The crops to be taken may be cash crops such as potatoes, maize, or pumpkins, or high-yielding supplementary food crops such as mangolds or chou moellier. The main point is that in ploughing up and sowing down again immediately to pasture the whole cost of cultivation, in addition to reseeding the new area, must be borne by the resultant pasture, whereas, if profitable cash or supplementary food crops are grown, the actual cost of resowing becomes less, as part of the cost of cultivation involved may be rightly charged to the crops other than the new pastures.

Winter grazing: Factors to be taken into account on individual farms in working out a system of winter grazing include climate, the suitability of soil, the stock carried in relation to

paddock sizes, the necessity of careful grazing of young or wet land pastures, the heavy grazing of types of fern, fog, or rat-tail-dominant pastures, and the use of certain areas for feeding out. However, it should be remembered that hard and continuous grazing will produce, first, clover-dominant and then, at times, flat weed-dominant swards rather than a balanced mixture of grass and clover. Overstocking in the winter may be one of the greatest causes of pasture deterioration, for which understocking in the summer is not a remedy. The production of supplementary feed, hay, and silage, the shutting up of paddocks for winter use, and the adjustment of stock numbers according to seasonal variations are all measures which should have been taken to adjust feed requirements to the winter carrying capacity. The planning of stock food supplies for next winter cannot begin too early.

Pasture treatment: Improvement of existing pastures may be carried out now, especially on dairy farms. Harrowing of swards to spread stock manure should be carried out if it has not been done.

Topdressing and liming work may be continued. On country where big stones hinder mowing for hay or small seeds it may be possible at this time to use a heavy roller for burying them in the soil.

LUCERNE

The area of lucerne in New Zealand has increased slowly over the last 20 years and most of the increase has been in Canterbury.

There is great scope for its increased use in Canterbury; over the rest of New Zealand its value on every type of farm does not appear to be appreciated sufficiently. An adequate area in lucerne is a precaution against drought in the summer and against lack of feed in the winter.

Lucerne is valuable for its high production of good-quality hay for winter use, or, when drought threatens, it may be cut and fed out green.

There are only a few soils where lucerne cannot be made to succeed. Too high a water-table or a hard pan is the most likely soil condition to cause failure. Pre-cultivation work for the sowing of lucerne next season should be started now. Skim-ploughing of grassland followed by deep ploughing to turn up the soil to the winter frosts is the best preparation. As lucerne is as permanent as grass, or, in some districts, more permanent, it is essential that sufficient preparatory work is undertaken in ample time to allow the seed to be sown in the best possible conditions.

THE WHITE SAPOTE

A Little-known. Sub-tropical Fruit which can be grown in
Citrus Districts

THE white sapote is a little-known fruit which can be grown in favourable localities in New Zealand. The ornamental appearance of the tree and the value of the fresh fruit should commend it for planting in the home garden. This article by P. Everett, Orchard Instructor, Kaikohe, describes this unusual fruit.

THE white sapote (*Casimiroa edulis*, La Llave) is a sub-tropical fruiting tree, a native of Central America, where it is one of the principal cultivated fruits. It will tolerate several degrees of frost without injury, is claimed to be more frost resistant than the principal cultivated varieties of avocado, and could no doubt be grown successfully wherever citrus fruits will grow. The tree is semi-deciduous, of medium size, erect or spreading, and has shiny green leaves. It is relatively drought resistant, and will thrive on a wide range of soil types, but prefers a well-drained sandy loam. In dry regions or during long periods of drought white sapotes should be irrigated in the same manner as citrus trees.

The tree has small, greenish, inconspicuous flowers and round or pear-shaped greenish fruit, the flesh of which is creamy, of soft, melting texture, usually very sweet, and containing from three to five large seeds. It has a pleasant flavour, resembling that of a rock melon, and is usually eaten raw, though attempts have been made overseas to preserve it on a commercial scale. The fruit can be allowed to ripen on the tree or picked when firm and ripened in ordinary stor-

age, which requires 7 to 10 days under New Zealand conditions.

Plants can be raised from seed, which should be sown in. deep in light, porous soil as soon as possible after it is removed from the ripe fruit, though the seed will usually not germinate until the following spring. Seedlings seldom come into bearing before 7 years of age and more often it is 12 or more years after planting before fruit is produced. Furthermore, many seedlings produce fruit of inferior quality, and for these reasons the most satisfactory method of raising plants is to work buds from trees which are of proved vigour, cropping capacity, and quality on to seedling stocks.

Method of Budding

Stock plants should be budded when about $\frac{3}{4}$ in. in diameter at the base, this size usually being attained in the second season after planting. Budwood should be taken from the ends of fairly mature branches which have assumed an ash-grey colour, and the buds inserted when the stock plants are in most active growth. Shield budding is the method usually used. Three or four weeks after budding the binding should be unwrapped and then loosely re-wrapped, the stock being cut back at the same time, leaving a stub 9 in. long to which the new growth can later be tied for support. The stub should be removed altogether the following year. Trees should be set out in their permanent positions 1 or 2 years after budding, and should be not closer than 20 ft. apart when planted on the square. It is necessary to take out the ends of the young shoots when the trees are young to encourage a branching habit and avoid having trees with long, bare main stems.

In New Zealand several seedling trees are flourishing at Auckland and Kerikeri, at least one at Whangarei, and there are possibly others. Several of these trees are 12 to 15 ft. high and are distinctly ornamental. One seedling tree at Kerikeri began to bear fruit 12 years after planting out and the following year produced about 100 fruits ranging in diameter from $2\frac{1}{2}$ to 3 in. The fruit ripens mainly during

April. Three other seedling trees at Kerikeri produced few or no fruits up to 15 years after being planted. The tree at Whangarei is producing a light crop annually. Several varieties have been described by overseas writers, but none of these appears to have been established in New Zealand yet.

Apart from slight thrip injury to the foliage and fruit, the only pest or disease attacking the sapote in New Zealand is the fungus disease glomerella (*Glomerella cingulata*), which causes circular, dark-coloured spots $\frac{1}{4}$ in. or more in diameter on fruit nearing maturity. These spots slowly extend and cause the whole fruit to decay. Attacks of glomerella can be controlled by spraying the trees with $1\frac{1}{2}$ -3-50 Bordeaux mixture. The first application should be made early in February and others at three-weekly intervals until the crop is harvested.

White sapote could be grown successfully in many parts of Auckland Province and probably in other localities in New Zealand, and fair crops of fruit of good quality and flavour should be produced if propagation is done with budwood taken from trees for which the climate has proved suitable. More experimental work is required, particularly the testing of strains and varieties, before stocks can be recommended for commercial planting.

Capacity of Cylindrical Tanks

A SIMPLER method of finding in gallons the capacity of cylindrical tanks than that published on page 139 of the February issue of the "Journal" has been supplied by Mr. R. G. Watson, principal of Pasadena Intermediate School, Point Chevalier, Auckland. His simplified method is as follows:—

Find in inches the diameter of the cylindrical tank.

Square this number (i.e. multiply it by itself).

One tenth of the answer will give in gallons the approximate capacity of 3 ft. of the tank.

Example

Diameter 18 in. $18 \times 18 = 324$. One tenth of 324 is 32.4 gallons for every 3 ft.

Similarly: Diameter 20 in. $20 \times 20 = 400$. One tenth of 400 is 40. Hence 40 gallons for every 3 ft.

Note

The capacity is underestimated by about 1 gallon in every 50 gallons.

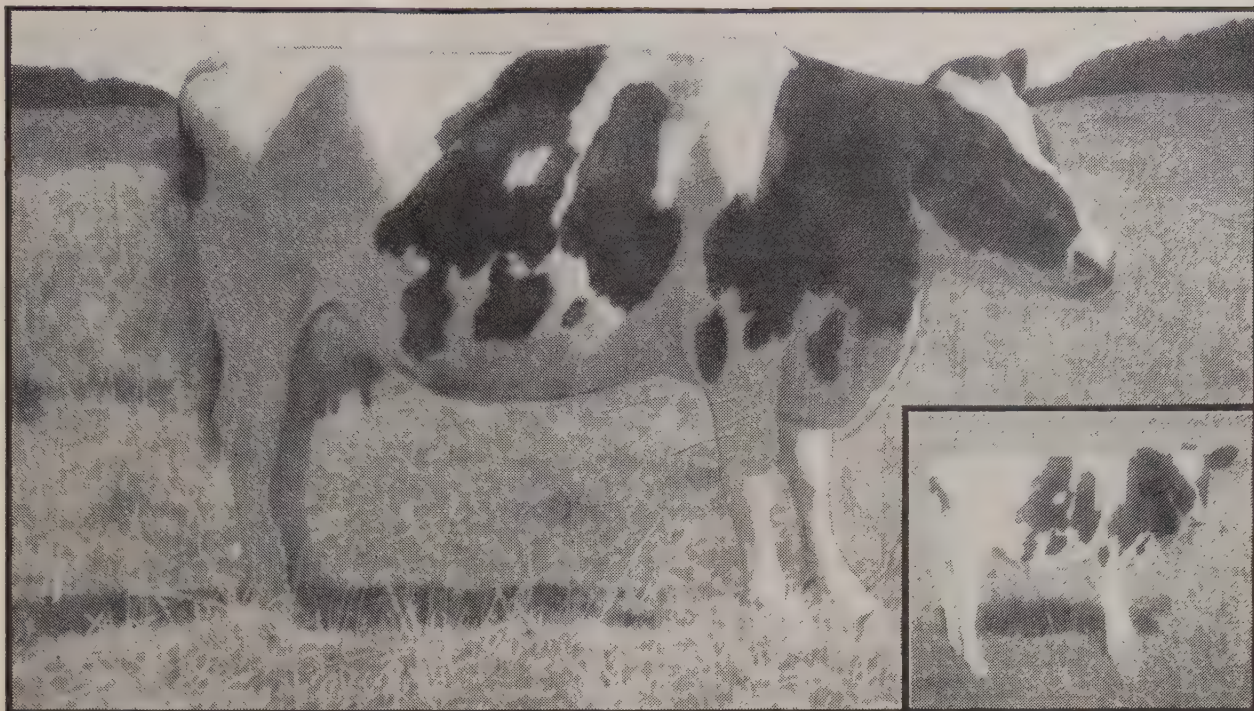
SHOW DATES

May 30, May 31, June 2, June 3, June 4—Otago A. and P. Society's Winter Show at Dunedin.

June 20, June 21—Rotorua A. and P. Association's Winter Show.



A branch and fruit of a white sapote tree growing at Kerikeri.



AMENDED RULES FOR TESTING DAIRY HERDS

A MENDMENTS to the rules for Certificate-of-Record Testing and Government Official Herd-Testing of purebred dairy cows have been made by the Dairy Division of the New Zealand Department of Agriculture. These amendments are made on the revised issue of June, 1944. For the convenience of dairy farmers and others interested the complete and newly-revised conditions are printed as under with the changes set out in bold type.

(1) CERTIFICATE-OF-RECORD TESTING

NOTE.—The Certificate-of-Record Test, the rules of which are herein-after set forth, is divided into two principal classes—namely, the 365-day, or Yearly Division, and the 305-day, or Ten-months Division, the short titles of which are the C.O.R. (Yearly) Test and the C.O.R. (305-day) Test respectively.

PART 1.—C.O.R. (YEARLY) TEST

1. (a) The Dairy Division of the Department of Agriculture will assist in the Certificate-of-Record Testing of only such cows as are duly and properly registered in the New Zealand Herd-book of the breed to which they belong.

(b) No cow shall be eligible for entry unless the owner is a member of his Breeders' Association.

(c) No four-year-old or mature cow shall be eligible for entry unless she shall have dropped a living or mature calf within 455 days prior to the calv-

ing for commencement of test. (See Rule 19.)

(d) Any rules herein prescribed for the owner of a cow on test shall also be binding upon his agent.

Change of Ownership during Testing-period

(e) The acceptance of an application for the entry of a cow will not bind the Department to continue the supervision of the test in the event of change of ownership during the testing-period. The Department will, however, make every endeavour to continue the test, provided it is notified within one week after the date of the sale of the name and address of the purchaser, and provided also that such continuance shall be contingent upon the agreement of the new owner to comply with the rules herein contained.

Application for Testing

2. It shall be the duty of every owner offering a cow for test—

(a) To forward to the Secretary of

his Breeders' Association at least 30 days before due calving-date, and on a form to be supplied by the Department, an application properly filled in with the particulars required by such form, and the Secretary shall certify to the accuracy of the particulars as provided in the said form: Provided that inability or failure to furnish the exact age shall not necessarily be a bar to entry, but all cows the age of which cannot be so ascertained may be required to qualify as mature cows or as cows of such age as the Director of the Dairy Division, having regard to all the circumstances of the case, shall deem just. If he so desires, the Director shall be supplied by the owner with a veterinary certificate regarding age.

(b) To forward payment of testing fees to the Director of the Dairy Division, Wellington, before the cow or cows entered for test commence their period of test.

Identification

(c) No Friesian cow or heifer shall be eligible for entry for C.O.R. test unless the application is accompanied by a photograph taken from the right side of the animal and suitable for identification purposes, such photograph to remain the property of the Dairy Division; and no Jersey, Ayrshire, Milking Shorthorn, Red Poll, or Guernsey cow or heifer born on or after the 1st July, 1930, shall be eligible for entry unless such animal is suitably identifiable by a tattoo-mark in the ear, such mark to be a distinguishing number or code approved by the Director of the Dairy Division.

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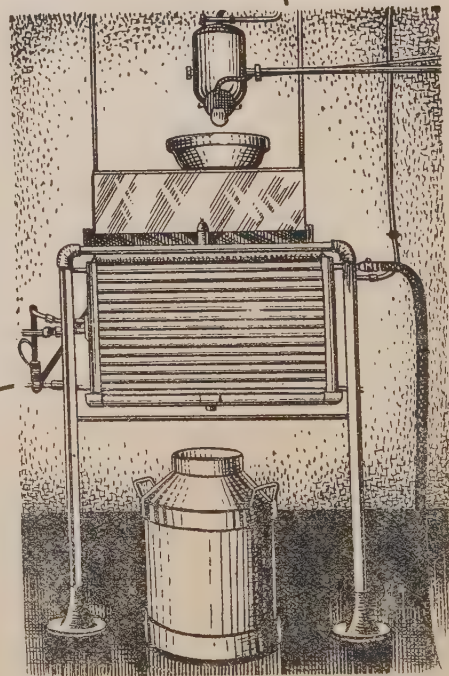
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Recording and Forwarding of Milk-weights

3. (a) The owner or his agent shall, commencing not later than the fourth day after calving (see Rule 13), weigh and record the weight of each and every milking of the cow during her testing-period, and it is hereby expressly provided that this shall include all milkings during the time the cow may be attending any Show, or otherwise away from the owner's farm. The milk shall be weighed and the weight recorded immediately after the cow has been milked. Milk-weights shall be recorded to tenths of a pound. A copy of the recorded weights shall be kept in the milking shed and shall be available for perusal by the Testing Officer or any other authorised person at any time.

(b) The owner shall forward to the Director of the Dairy Division, Wellington, within one week after the end of each calendar month a legible copy in ink of this record. Record blanks for this purpose shall be supplied by the Department.

Unrecorded Milk-weights.—Scales.—Lubricant for Milkers' Hands

(c) The owner shall not fill in any space occasioned by any weighing or weighings being lost or inadvertently or otherwise missed, but when forwarding the monthly weights shall include an explanation of such omission, and the Director of the Dairy Division shall determine what allowance, if any, shall be made.

(d) The scales used shall meet with the approval of the Director of the Dairy Division, and shall be graduated to weigh to one-tenth of a pound. In cases where it is found that the owner's milk-scales are not recording correctly (either through the scales being inaccurate or through incorrect tare for the weighing bucket being allowed), the Director of the Dairy Division shall have power to adjust the milk-weights by such amount and for such period as he deems proper.

(e) Where the milker milks with dry hands—i.e., without using milk as a lubricant—the use of vaseline, petroleum jelly, or other such substance may be permitted, provided that in the opinion of the Testing Officer the quantity so used is not excessive. If milk is used for this purpose no other lubricant shall be permitted.

Milking-hours.—Number of Milkings per Day, Stripping, Etc.

(f) The milking-hours for test cows and the number of milkings a day shall meet with the approval of the Director of the Dairy Division. The milking-hours observed at one monthly visit shall not be varied at the next succeeding monthly visit unless the Testing Officer has been previously advised.

... C.O.R. AND OFFICIAL HERD-TESTING

(g) No cow shall be stripped more than once after each milking during the testing-visit. Where milking-machines are used stripping shall be carried out immediately after the machines are taken off. Where test cows are milked by hand the milking and stripping shall constitute one operation.

(h) It shall be the duty of the owner, at the request of the Director of the Dairy Division, to so arrange his milking-hours that the Testing Officer may take the check weights and samples on the same dates as for one or more other breeders in the vicinity.

(i) No cow shall be milked more than three times daily.

(j) The cow shall be milked the same number of times on the days of the Testing Officer's visit as she has been immediately prior to such visit.

(k) The owner or his agent shall see that the milk submitted to the Testing Officer for sampling, or weighing, or both, is the milk as it has come from the cow, and that nothing has been added or taken away.

(l) The owner shall see that the conditions pertaining to the treatment, milking, milking arrangements, &c., of cows on C.O.R. test at the time of the Testing Officer's visit shall meet with the approval of the Testing Officer.

III.—treatment of cows on test shall be deemed sufficient grounds for the discontinuance of the testing.

Milking-machines and Milk Interceptors

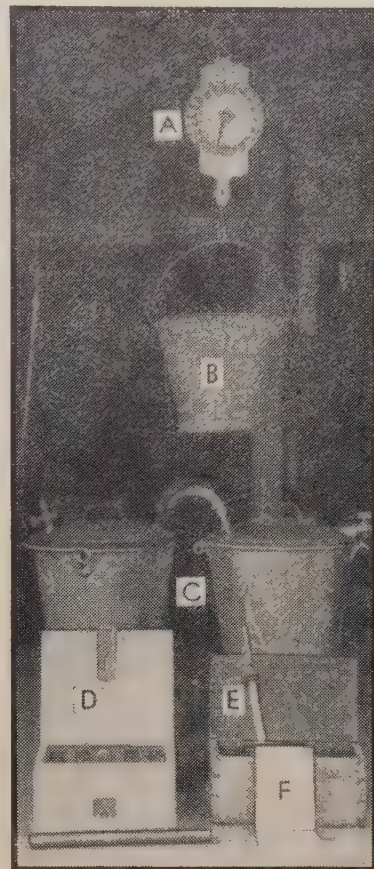
4. (a) Where the cows are being milked by machinery a vacuum bucket shall be used during the period of the Testing Officer's visit.

(b) In any case where the Director of the Dairy Division considers that the type of milking-machine being used, or the manner in which it is being used, is likely to permit a carry-over of milk into the bucket of a cow on test, he shall have the right to require the owner to use an interceptor as supplied by the Department at all milkings of C.O.R. cows and at all milkings of Gov't O.H.T. cows which are to be sampled (1) whether there is a glass interceptor on the machine or not, and (2) whether there are other cows being milked at the same time as C.O.R. and Gov't O.H.T. cows or not.

Board and Lodging for Testing Officer

5. Where the Director of the Dairy Division may consider it necessary the owner shall provide the Testing Officer with free board and lodging during the period of his testing-visit.

Where this provision is not complied with the owner may be required to pay the cost of such board and lodging



[G. F. Framjee photo.]

Testing Officer's equipment: A—Scales accurate to tenths of a pound. B—Special weighing bucket on hook. C—Vacuum test buckets. D—Sample boxes with locks. E—Graduated pipette. F—Testing Officer's notebook.

at the nearest convenient hotel or boarding house.

Feeding

6. The owner shall see that no milk or milk product is fed to any cow on Certificate-of-Record Test, and, excepting as remedies in case of sickness, no condiments, condition-powders, or stimulants or drugs shall be given.

Fraudulent Practice

7. Any owner who fraudulently tampers with a test cow or with her milk, or who in any way attempts to bring about unreliable results, may have the testing discontinued and may be debarred the right of entering further cows for test.

Dates of Service

8. The owner shall indicate on the first monthly weight-sheet forwarded to the Department after service the

C.O.R. AND OFFICIAL HERD-TESTING . . .

date of the first and any subsequent service during the testing-period.

Notification of Calving subsequent to Test

9. The owner shall, within twenty-four hours after the calving subsequent to test, notify the Director of the Dairy Division of such calving. This rule shall also apply to premature calving.

A certificate may be refused where notification of subsequent calving is not made sufficiently promptly to enable the calving to be confirmed by inspection.

Declaration

10. (a) It shall be the duty of the owner after the cow has calved subsequent to test to make declaration, on a form to be supplied for that purpose by the Department, of the weights of milk given by such cow in each month or part thereof during such testing-period, and of her name, registered number, age, date of calving prior to test, date of calving for period of testing, date of effective service, and date of calving subsequent to test.

(b) Should a cow under this test be sold, and the testing be continued on behalf of the purchaser it shall be the duty of the vendor to forward to the Director of the Dairy Division a declaration indicating all relevant particulars required by the form of declaration referred to in (a) above, and which have occurred prior to the time of transfer of the cow.

(c) The Director of the Dairy Division shall have the right to require the owner to make declaration to any item of the form of application for testing, or to require the owner to procure declaration from the person competent to declare to such item.

(d) In all cases declaration must be completed and returned to the Director of the Dairy Division within thirty days of date of despatch. If the owner fails to comply with this rule acceptance of further applications may be refused.

Qualifications relating to Dates of Calving.—Premature Calving

11. Every cow, in order to qualify for a first-class certificate, must drop a mature calf within 455 days after the day of calving for commencement of test: Provided that, in the case of a cow aborting or calving prematurely within this 455-days period, the cow must have been served so as to drop a mature calf within 455 days. (The period of gestation shall be deemed to be 282 days.) It is also provided that prior to the date of abortion the Director of the Dairy Division must have been advised by the owner or his agent of the date of effective service. Provided also, that wherever he may

consider it necessary the Director of the Dairy Division may require the owner to supply a veterinarian's certificate regarding calving subsequent to test. Calving within the testing-period, whether premature or normal, shall terminate the testing-period.

Rights and Duties of Testing Officer

12. The Testing Officer of the Department shall have right at any time to visit the farm on which the cow is under test and he shall have the right to perusal of milk-weights on demand, and to check the yield and to take samples at any number of milkings during the period a cow is under test. He shall make his ordinary testing-visits as nearly as possible once during every calendar month, and on whatever dates he may choose. For the first milking during such visit he shall take the weight but no sample, and he

LATE DELIVERY OF "JOURNALS"

Subscribers who are inconvenienced by late delivery of their "Journals" are asked to allow a reasonable time to elapse before communicating with the Department, as in many cases the delay is unavoidable and copies are eventually delivered while the complaint is being investigated. The increasing circulation has raised a number of printing and labour difficulties, and these have been aggravated by the power shortage. Everything possible is being done to print and deliver the "Journal" on time, but readers may occasionally be inconvenienced by delays.

shall take the time at which the milking is made. For the following two milkings (or three, according as the cow is milked twice or three times daily) he shall check the weights and take samples, and the last milking shall commence twenty-four hours after the commencement of the first milking of his visit. Each milking shall be tested separately, and the samples shall be kept under lock and key or sealed until tested. They shall be prepared and tested by a departmental officer. No cow shall be tested when her yield is less than 4lb. of milk per day. No cow shall be tested until a period of at least ninety-six hours has elapsed between calving and the taking of the first sample and the Director of the Dairy Division shall have the right to discard any test taken within 7 clear days after calving.

The Testing Officer shall keep the cow and the milker under strict supervision during the whole of the milking operation.

The Testing Officer shall try the cow's teats after the preliminary milking to see that such cow has been stripped clean by the milker, and he shall have the right so to do for any cow on test at any milking at time of his visit.

Abnormal Tests—Method of calculating Production

13. The percentage of butterfat for the month shall be that as calculated for the day's test from the total weight of milk and butterfat produced during the twenty-four hours.

The monthly fat-production of a cow shall be calculated by figuring the total milk credit for the month at the average test for the day obtained by the Testing Officer, provided that should the average percentage of fat found in the milk during any monthly test be considered abnormal by the Director of the Dairy Division, he may reject that test and use such percentage as he may think just, and he shall have the right to defer decision until the taking of such further tests as he may consider necessary.

The annual production shall be calculated by totalling the production of pounds of milk and butterfat for each month or part thereof during one lactation period, and not exceeding 365 days, commencing not later than the fourth day after calving. The first return of monthly milk-weights shall be accepted as indicating whether the 365-days period commences on the day of calving or the first, second, third, or fourth day after calving.

The first and last day of the testing-period for which milk-weights are forwarded shall each be counted as a full day even though the weight of only one milking may have been recorded on such days.

Discontinuing Test

14. The testing of a cow may be discontinued by the Department and without refund of testing fee in any of the following events:—

- (a) If, after 150 days on test she has produced less than one-half her requirements for qualification for C.O.R. or is, in the opinion of the Director of the Dairy Division, unlikely to produce the minimum amount of butterfat required for certificate from a cow of her age;
- (b) If the only cow on test at a breeder's farm is unlikely to calve in time to qualify for a First-class Certificate;
- (c) If in the opinion of the Director of the Dairy Division the milk-weights as forwarded to this office have not been authenticated;

C.O.R. AND OFFICIAL HERD-TESTING

- (d) If in the opinion of the Director of the Dairy Division the testing breeder has not afforded the Testing Officer all reasonable facility for carrying out his duties.
- (e) If any of the duties prescribed by these rules for the owner of a cow on test have been contravened or not given effect:
- (f) If the owner furnishes incorrect information relating to the name, age, date of calving, or any other particular in connection with any cow on test.

The Department may refund the testing fee and discontinue the test for any owner who, on request by the Director of the Dairy Division, declines to arrange his milking-hours so that a Testing Officer may visit one or more other testing breeders on the same dates.

If the owner of a cow under test or any agent of the owner commits any breach of these rules so as to warrant the discontinuance of the test, the Director may, if he considers the breach of sufficient gravity, discontinue the testing of all or any other cows belonging to the same owner and under test. No refund of fees shall be made in any such case.

Acceptance of Application

15. The Director of the Dairy Division may decline acceptance of application in any case where such testing cannot conveniently be undertaken by the existing staff of Testing Officers, and he may decline acceptance of application from any owner who at any time has been refused certificates on account of breach of rules, or on account of the recorded milk-weights not having been authenticated, or the testing of whose cows has been discontinued on account of breach of these rules, or on any other grounds which the Director, in his discretion, may deem sufficient.

Disqualification

16. The Director of the Dairy Division shall have the right to disqualify from Certificate-of-Record and Government Official Herd-Testing, and for such period as he may think fit, any breeder who has been disqualified from any other recognised system of testing or from his Breeders' Association on the grounds of irregular practice.

Testing Fees

17 (a) For the first cow or heifer to be tested on one farm and commencing test on or after the 1st April of each year the fee shall be eight guineas, and for each subsequent cow or heifer commencing test within the same year and milked in the same shed the fee shall be three guineas: Provided that a period of not more than six months shall elapse between the date of calving of the first and last cow or heifer entered. This shall be the charge for



[G. F. Framjee photo.]

Testing Officer taking aliquot sample of milk with a graduated pipette.

the work done during one lactation period only and not exceeding 365 days; commencing not later than the fourth day after calving.

(b) Should an owner desire to test his C.O.R. entries at more than one shed an eight-guinea fee shall be payable for the first cow or heifer to be tested at each shed. This rule, however, shall not apply provided that the sheds are on the one farm; that the average number of cows to be tested in each shed is not less than four; and that the Testing Officer can satisfactorily carry out the testing at the different sheds on the same dates.

(c) It shall not be permissible for an owner to test his cows on the farms of other testing or non-testing breeders without the approval of the Director of the Dairy Division and at such fees as the Director may prescribe.

(d) In the case of transfer of ownership during the testing-period the following rules shall apply: If the cow which is transferred during her testing-period be the only cow on test at the farm of the vendor, no further fee shall be payable. If the purchaser of

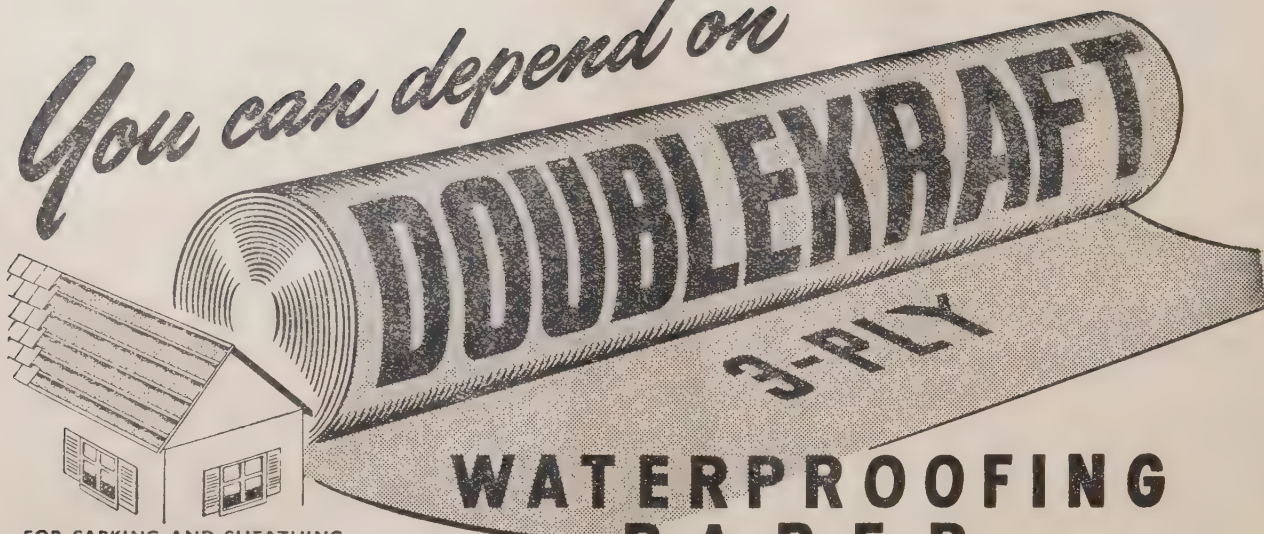
such cow has other cows on test at the time of transfer, no further fee shall be payable, provided the completion of the testing of any purchased cow does not continue beyond the last test for any cow then on test at the farm of the purchaser.

(e) In all other cases the fee payable shall be at the discretion of the Director of the Dairy Division.

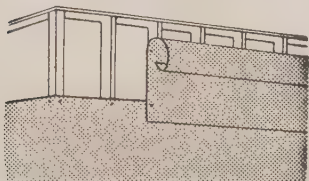
First-class Certificate

18. The owner of every heifer or cow which shall have produced the minimum pounds of butterfat required by an animal of her age and class as determined by Schedule A appended shall on compliance with all the rules hereinbefore contained, be entitled to a First-class Certificate. Every certificate shall appertain to the cow to which it relates, and shall be given to the owner of the cow at the date of her calving subsequent to test. If the owner at that date is not the person who entered the cow for testing, the latter may obtain a copy of her certificate on application in that behalf.

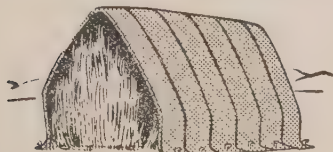
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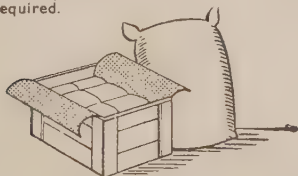
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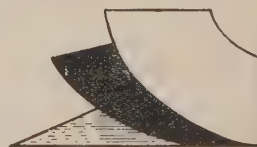
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A M A L T H O I D P R O D U C T

Second-class Certificate

19. A cow or heifer duly accepted for test on the above rules and which fails to calve subsequent to test in accordance with the provisions for a First-class Certificate shall be deemed to have qualified for a Second-class Certificate provided—

- (a) That she produced the butterfat requirement for her age;
- (b) That in the opinion of the Director of the Dairy Division the owner of the cow or heifer has done all within reason to have such cow or heifer qualify on subsequent calving for a First-class Certificate—i.e., within 455 days after calving for commencement of test.

Re-entry for Second-class Certificate

20. A cow qualifying for a Second-class Certificate shall be eligible for re-entry for a Second-class Certificate during the following lactation period, and shall be granted such certificate, provided that, with the exception of the requirements relating to previous calving, the incidents of the test shall conform to the requirements of a First-class Certificate, and provided also that at the same farm there is on test at least one cow which is eligible to compete for First-class Certificate.

Non-issue or Cancellation of Certificate.—Issue of Certificate

21. (a) No certificate, either first-class or second-class, shall be granted if in the opinion of the Director of the Dairy Division the milk-weights as forwarded by the owner have not been authenticated, or if the owner commits any breach of these rules: Provided that in cases where the Director of the Dairy Division considers the main objective of the C.O.R. testing will be better met, he may issue a certificate based on the recorded milk-weights adjusted to such extent as he deems right and proper.

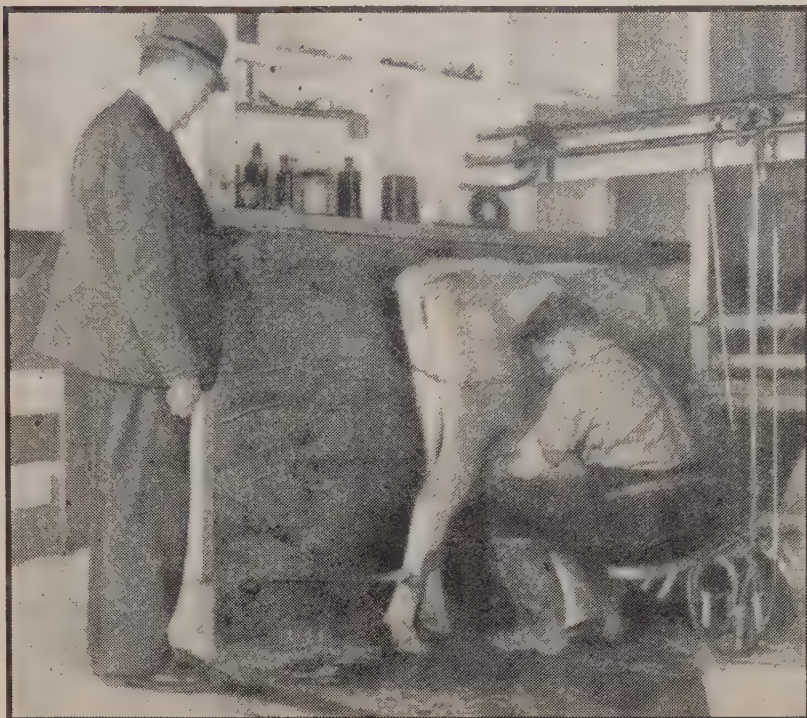
(b) A certificate may be cancelled and the record expunged if it subsequently be found that, in the opinion of the Director of the Dairy Division and of a majority of the Executive of the Breeders' Association of which the owner is, or was, a member, the record was not made in accordance with the rules. In any case of the non-issue of a certificate the decision of the Director shall be final, and need not be accompanied by any statement of the reason governing the decision.

(c) In every case where a cow qualifies for Certificate of Record such certificate may be issued and particulars entered in the records of the Department and forwarded to the Secretary of the Breeders' Association concerned.

Statement of Production

22. A statement of production shall be issued to the owner of every cow

C.O.R. AND OFFICIAL HERD-TESTING



[G. F. Framjee photo.]

A Supervising Officer makes a surprise check of the milking of a cow on test.

tested under Certificate-of-Record Test for 200 days or more and which fails to produce the minimum butterfat standard for certificate.

Advertising of Records

23. Whenever publishing or advertising the record of any cow which is on test, or which has been on test, the particulars used shall, unless otherwise stated, be strictly in accordance with the official statement issued by the Director of the Dairy Division. No figures applying to a record on which a cow has been refused certificate or whose record has been expunged or whose testing has been discontinued by the Department on the grounds of breach of rules or improper practice shall in any case be used; or, if any figures for such cows be in print at the time of notice of discontinuance by the Department, such figures shall immediately be withdrawn.

In the event of sale, either privately or by public auction, of any cow whose testing has been discontinued by the Department, or whose certificate has been cancelled, the owner or his agent shall, before offering such animal for sale, announce that the figures supplied by the Dairy Division and appearing in the catalogue, or in any way previously advertised, are void.

Breeders owning a cow with a Second-class Certificate shall, whenever advertising or publishing the record, use the description "II Class

C.O.R." immediately preceding the butterfat figures for such record—thus, "II Class C.O.R., 555lb. fat."

Any breeder or owner failing to comply with the foregoing may be refused certificate for any cow which may be on test at the time of breach of these rules, and may also be debarred the right of entering further cows for test.

The Director of the Dairy Division shall have the right to publish, in any way he may think desirable, the record of any cow on test, or which has been on test.

Interpretation of Rules

24. In the event of any question arising as to the administration of the Certificate-of-Record Test, or as to the interpretation of the rules governing the same, the Director of the Dairy Division shall consider the case, and his decision shall be final.

PART II.—C.O.R. (305-DAY) TEST Rules

The rules governing the C.O.R. (Yearly) Test set forth in Part I hereof shall also apply to the C.O.R. (305-day) Test under this part of the rules, subject, however, to the following alterations and/or conditions to the said rules:—

Application for Testing

Rule 2. Application for testing under the C.O.R. (305-day) Test shall be made on the same form and in the same way as for the full-year division,

C.O.R. AND OFFICIAL HERD-TESTING . . .

excepting that the application form shall be clearly marked C.O.R. (305-day) Test. It shall also be the duty of the owner, not later than the ninth monthly test for any cow, to advise the Testing Officer whether he desires the test terminated at the tenth monthly test or continued in the yearly division.

Rule 11. For "455 days" read "395 days."

Rule 13. For "365 days" read "305 days."

Rule 14 (a). For "150 days" read "130 days."

Testing Fees

Rule 17. For "365 days" read "305 days." Fees for the C.O.R. (305-day) Test shall be the same as for the C.O.R. (Yearly) Test.

Second-class Certificate

Rule 19. (b). For "455 days" read "395 days."

Issue of Certificate

Rule 21 (c). In the event of a cow entered in the 305-day division being continued on test in the 365-day division and qualifying for certificate under both divisions within the one testing-period, only one certificate shall be issued, and such certificate shall be for the 365-day division.

Advertising of Records

Rule 23. It shall be made clear that the certificate has been gained in the 305-day division.

SCHEDULE A.—CERTIFICATE-OF-RECORD TESTING OF REGISTERED PUREBRED DAIRY COWS

Classes

The classes for Certificate-of-Record cows as agreed upon by the respective Breeders' Associations are as follows:

Jerseys

Cows 2 years 92 days and under shall be classed as junior two-year-olds.

Cows 2 years 93 days and under 3 years shall be classed as senior two-year-olds.

Cows 3 years and under 4 years shall be classed as three-year-olds.

Cows 4 years and under 5 years shall be classed as four-year-olds.

Cows 5 years old and over shall be classed as mature.

Friesians and Milking Shorthorns

Cows 2 years 183 days and under shall be classed as junior two-year-olds.

Cows 2 years 184 days and under 3 years shall be classed as senior two-year-olds.

Cows 3 years to 3 years 183 days shall be classed as junior three-year-olds.

Cows 3 years 184 days and under 4 years shall be classed as senior three-year-olds.

Cows 4 years to 4 years 183 days shall be classed as junior four-year-olds.

Cows 4 years 184 days and under 5 years shall be classed as senior four-year-olds.

Cows 5 years old and over shall be classed as mature.

Ayrshires and Red Polls

Cows under 3 years old shall be classed as two-year-olds.

Cows 3 years and under 4 years shall be classed as three-year-olds.

Cows 4 years and under 5 years shall be classed as four-year-olds.

Cows 5 years old and over shall be classed as mature.

Yield of Butterfat required for Certificate

A heifer starting a test on the day she is two years old or before that date shall be required to give the amount of butterfat required of a two-year-old. For every day she is over two years old she shall be required to give 0.1lb. of fat more than her requirement as a two-year-old. This daily increase shall continue until the cow is five years old, when she shall be required to give the minimum for a mature cow. Thus:—

C.O.R. (Yearly) Test

If two years old at commencement of test, 275.5lb. fat.

If three years old at commencement of test 312.0lb. fat.

If four years old at commencement of test, 348.5lb. fat.

If five years old at commencement of test, 385.0lb. fat.

C.O.R. (305-day) Test

If two years old at commencement of test, 250.5lb. fat.

If three years old at commencement of test, 287.0lb. fat.

If four years old at commencement of test, 323.5lb. fat.

If five years old at commencement of test, 360.0lb. fat.

REMINDERS TO BREEDERS WITH COWS ON CERTIFICATE-OF-RECORD TEST

Preserving Monthly Milk-weights

Loss of monthly milk-weights in the post sometimes occurs. Breeders are strongly advised to retain a copy of all milk-weights forwarded to us until they receive from us their returns for the month. No credit shall be given where the milk-weights for the month are lost.

Breeders should communicate with the Director of the Dairy Division if monthly statement of yield is not to hand within the month following that for which weights were taken.

Shows: Absence of Cows from Owner's Farm

Breeders who are exhibiting at Shows cows which are on C.O.R. Test should be careful to see that all milkings at the Shows, or on the way to or from the Shows, are weighed and recorded as usual. The Department does not promise in any way to take notice of any milk-weights which are not duly recorded on such occasions.

The Director of the Dairy Division will endeavour to arrange the testing-visit to suit the absence of test cows at Shows or otherwise away from the owner's farm, provided he receives from the owner or his agent at least fourteen days' notice of the dates on which test cows are expected to be away from the farm. It may not be possible, however, to arrange the visit to suit, and consequently the Department accepts no responsibility with regard to the matter.

Notification of Change of Ownership

In the event of a cow being sold during her testing period, prompt advice of the name and address of the purchaser is requested. (See Rule 1 (e).)

Although the purchaser may not desire to continue the test, it is frequently necessary to communicate with him in respect of particulars relating to the testing record of the cow in question.

Notification of Dates of Service

It is in the interest of breeders to see that date of first and any subsequent service is indicated on the first monthly weight-sheet forwarded to the Director of the Dairy Division after service.

If a cow aborts after having produced her butterfat requirement a certificate may be granted, provided the Director of the Dairy Division has previously received advice of the date of satisfactory effective service.

Notification of Calving-dates subsequent to Test

Notification of calving-dates after testing period should be made by telegram if within a fortnight of time-limit (455 days after commencement of test—395 days for C.O.R. (305-day) Test); otherwise notice by letter is sufficient. The onus of notification of calving-dates subsequent to test rests with the owner.

For the purposes of record the Director of the Dairy Division will be pleased to receive notification of all calving dates, whether beyond the last day for First-class Certificate or not.

Declaration

The attention of owners is drawn to Rule No. 10. The prompt return of declarations not only ensures the issue

of certificates, but facilitates the compilation of records, summaries, &c., at the Dairy Division's headquarters.

Payment of Fees

If payment is made by cheque, exchange must be added. Cheques should be made payable to "Dept. of Agriculture," and not to any individual.

(2) GOVERNMENT OFFICIAL HERD-TESTING

1. The Government Official Herd-Test is an adjunct of the Certificate-of-Record Test, and the rules governing the Government Official Herd-Test shall be read in conjunction with the rules governing the Certificate-of-Record Testing of purebred dairy cows as published by the Department of Agriculture. Unless specifically provided herein, the rules governing the Certificate-of-Record Test shall apply to both systems of testing.

2. Every owner who has at least one cow accepted under the rules for the Certificate-of-Record Testing of Purebred Dairy Cows shall be eligible to make application to have cows tested under the Government Official Herd-Test, provided—

- (a) That no animal shall be eligible for acceptance unless she shall have calved not more than forty-five days prior to the Testing Officer's visit for the purpose of taking samples for C.O.R. test;
- (b) That the last cow entered for the Government Official Herd-Test shall calve not more than ninety days after the date of calving of the last cow accepted for Certificate-of-Record; or
- (c) That in the event of an officer of the Department commencing the test of official herd-test cows at the request of the owner or his agent, the Department does not undertake to continue the testing of such cows for more than one monthly test beyond the 365th day after calving for commencement of test of the last cow accepted for Certificate-of-Record Test. The full fee shall in any case be payable.
- (d) That the requirement of a C.O.R. entry may be waived if the owner agrees to place under Government Official Herd-Test every sound pedigree cow in his herd, and to pay in addition to the fees prescribed herein the fee payable for the first cow on Certificate-of-Record Test, namely eight guineas.

3. The transfer of a cow from Certificate-of-Record Test to Government Official Herd-Test may be per-

mitted provided such cow has received not more than six monthly tests under the Certificate-of-Record system. The fee chargeable shall be at the discretion of the Director of the Dairy Division.

4. The Government Official Herd-Test shall be confined to registered purebred dairy cows, save that for breeders in districts where no other organised system of testing is reasonably available or where cows other than registered purebreds constitute only a comparatively small part of the herd an extension to cows other than purebreds will be considered for C.O.R. testing breeders.

5. The fee for Government Official Herd-Testing shall be 2s. 6d. per monthly test per cow for each of the first two tests, and in the event of the continuance of the test no further fee shall be payable for the remainder of the lactation season, which shall not exceed 305 days, commencing with the day after calving: Providing that in the event of a C.O.R. testing breeder neglecting to make a C.O.R. entry, or withdrawing one or all of his C.O.R. Test cows before or after calving for commencement of test, or transferring one or all of his C.O.R. Test entries to Government Official Herd-Test, or to another farm, or another ownership, the Government Official Herd-Test shall be continued only on consideration of the fee of eight guineas for the first C.O.R. Test cow being paid to and retained by the Department.

6. The dates of the Testing Officer's monthly visits to an owner's farm shall be governed by the requirements of C.O.R. Testing, and not by cows on Government Official Herd-Test.

7. Should an owner desire to divide his testing-herd so that testing, whether C.O.R. or Government Official Herd-Testing, is required to be carried out at more than one milking-shed on the same farm, each shed shall be classed as a separate shed and a C.O.R. entry or its equivalent in fees required for each shed, except—

- (a) Where Rule 17 (b) of those governing the C.O.R. testing is complied with; or
 - (b) Where the total number of cows under Government Official Herd-Test on the farm is such as to necessitate the testing being carried out on separate testing-dates for each shed.
8. It shall be the duty of every owner offering a cow for Government Official Herd-Test—

- (a) To forward to the Director of the Dairy Division at least 30 days before due calving-date, and on a form to be supplied by the Department, an application properly filled in with the particulars required by such form:



[G. F. Framjee photo.]

Supervising Officer (at left) checking reading of sample by Testing Officer (right).

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- (b) To forward payment of testing fees to the Director of the Dairy Division, Wellington, within fourteen days after the taking of the second monthly samples by the Testing Officer, provided that in the event of a cow being withdrawn after the first test the testing fee of 2s. 6d., as set out in Rule 5 hereof, shall be payable within fourteen days after the date of such test.

9. No Friesian cow or heifer shall be eligible for Government Official Herd-Test unless the application is accompanied by a photograph taken from the right side of the animal and suitable for identification purposes, such photograph to remain the property of the Dairy Division; and no Jersey, Ayrshire, Milking Shorthorn, Red Poll, or Guernsey cow or heifer born on or after the 1st July, 1930, shall be eligible for entry unless such animal is suitably identifiable by tattoo-mark in the ear, such mark to be a distinguishing number or code approved by the Director of the Dairy Division.

10. Milking-machines may only be used in accordance with Rule 4 of those governing the C.O.R. Testing.

11. The owner shall see that the conditions pertaining to the feeding and treatment of cows on Government Official Herd-Test at the time of the Testing Officer's visit shall not vary from the average conditions under which the cows are fed and treated.

12. Except with the written permission of the Director of the Dairy Division, no cow on Government Official Herd-Test shall be milked more than twice daily.

13. Should any cow on Government Official Herd-Test be sold before the expiry of her 305-days' testing-period to a person who has a cow on C.O.R. Test, the Department will endeavour to complete the test. In no other case, however, does the Department promise to make any endeavour so to do.

14. The testing-period shall be for a maximum of 305 days commencing with the day after calving.

15. The Testing Officer of the Department shall have the right at any time to visit the farm on which a cow is under test, and he shall have the right to check the yield and to take samples at any number of milkings during the period a cow is under test. He shall make his testing-visits as nearly as possible once every calendar month. For the first milking during his visit he shall record the time at which the milking is made, and he shall strip the cows sufficiently to ensure that they have been milked dry. For the remaining milkings of the twenty-four-hour visit he shall take check weights and samples, and the last milking shall be twenty-four hours later than the first milking of his visit. All samples shall be kept

... C.O.R. AND OFFICIAL HERD-TESTING

under lock and key or sealed until tested. No cow shall be tested when her yield is less than 4lb. of milk per day. No cow shall be tested until a period of at least ninety-six hours has elapsed between calving and the taking of the first sample, and the Director of the Dairy Division shall have the right to discard any test taken within 7 clear days after calving. The Testing Officer shall keep the cows and the milker under strict supervision during the whole of the milking operations.

16. The percentage of butterfat for the month shall be that found from the one day's samples taken by the Testing Officer. Should the average percentage of fat found in the milk during any monthly test be considered abnormal by the Director of the Dairy Division, he may reject that test and use the average percentage of fat obtained from the preceding and succeeding months, or such other test as he may consider reasonable, as a basis for computation of the fat-production for that month. The milk-production for the month shall be calculated by totalling the one day's milk-weights taken by the Testing Officer and multiplying the result by the number of days in the month: Provided that should the milk-weights taken by the Testing Officer be considered abnormal by the Director of the Dairy Division he may reject such weights and substitute such credit as, having regard to the cow's preceding and succeeding milk-production, he may think just. The monthly fat-production of a cow shall be calculated by figuring the total milk credit for the month at the test for the day obtained by the Testing Officer. The season's production shall be calculated by totalling the production of pounds of milk and butterfat for each month or part thereof during one lactation period and not exceeding 305 days commencing with the day after calving: Provided that if a cow calves prematurely so as to cause no interruption in the milking period the test may be continued until the expiry of 305 days and recorded as for one lactation. For the period between calving and the commencement of the calendar month during which the first samples are taken, the yield shall be calculated at the rate of the milk-weights and test found by the Testing Officer at the time of his first monthly visit after calving. For the period between the taking of the last samples and the three hundred and fifth day, or the drying-off date, as the case may be, the production shall be calculated at the rate of the last milk-weights and test found by the Testing Officer, or at such other rate as the Director of the Dairy Division may consider reasonable. The period between the taking of the last

samples and the drying-off date or termination of test shall not exceed forty-five days.

17. Breeders owning a cow with a Government Official Herd-Test record shall, whenever advertising or publishing the record, use the description Government Official Herd-Test, or the abbreviation Gov't O.H.T. It shall not be permissible to use any description which is likely to be confused with the Certificate-of-Record Testing, such as C.O.R., semi-official record, S.O., S.O.R., &c.

Neither shall it be permissible to use any description likely to be confused with C.O.R. or Gov't O.H.T. in connection with any records not made under these systems.

18. The testing for a breeder may be discontinued in whole or in part by the Department and without refund of testing fees, provided—

- (a) That, in the opinion of the Director of the Dairy Division the testing breeder has not afforded the Testing Officer all reasonable facility for carrying out his duties;
- (b) That any of the duties prescribed by these rules for the owner of a cow on test have been contravened or not given effect;
- (c) That the owner has in any way published or advertised a Government Official Herd-Test record in a manner which misrepresents the true position.

The Director of the Dairy Division shall have power to discontinue the testing of Gov't O.H.T. cows if the C.O.R. entries are withdrawn or for any reason disqualified.

19. Cows on Government Official Herd-Test shall be milked either before or after C.O.R. cows.

Moreover, C.O.R. cows shall be milked consecutively and Gov't O.H.T. cows shall be milked consecutively.

20. The owner of every heifer or cow on this test shall receive each month a statement of the yield of each cow for the preceding month and from date of calving to the end of that month. He shall also be supplied at the end of the season with a statement indicating the yield of each cow for that period.

21. In the event of any question arising as to the administration of the Official Herd-Test, or as to the interpretation of the rules governing same, the Director of the Dairy Division shall consider the case, and his decision shall be final.

Note.—The Dairy Division strongly recommends breeders entering cows for C.O.R. Test to test all other sound registered purebred cows per medium of the Government Official Herd-Test.

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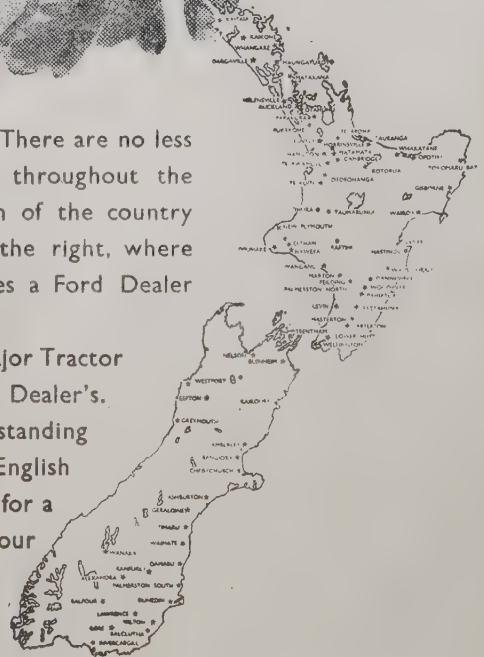
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DIGGING AND PITTING POTATOES

Care Necessary to Preserve Keeping & Marketing Qualities

By J. D. WRAIGHT, *Fields Instructor, Timaru.*

HAND digging of potatoes with a fork has been replaced almost universally by the mechanical potato digger, and some knowledge of the care which must be exercised in handling this machine is necessary to avoid damaged tubers and consequent loss in keeping and marketing qualities.

GROWTH has usually ceased by the time of the first frosts, and the potato crop has in most areas reached maturity, all but very late-sown crops being ready for digging. The dying down and drying off of the haulms and the condition of the skin of the tuber itself are indications of the maturity of the crop. If the skin is easily rubbed, the crop is immature, but if the skin is firm and not easily rubbed, the crop can be dug without great risk of damage, provided reasonable precautions are taken.



Strips of rubber fitted along each side of the frame of the potato digger as indicated by the dots and arrows will lie over the ends of the bars of the second apron, thus breaking the fall and throwing the potatoes more into the centre of the apron. This minimises damage to tubers.

If the rows are not correctly spaced, it is possible for one wheel of the digger to run along the edge of a row with the result that quite a number of the tubers are crushed, and if the digger is not kept at a sufficient depth, the potatoes are sliced. Although both these causes of damage can be overcome if proper care is exercised by the operator of the machine, the proportion of damaged tubers is almost certain to be larger than on a hand-dug area.

The main damage, however, occurs on the apron which conveys the dirt and potatoes out of the ground and which is agitated by sprocketed rollers to free the potatoes from the dirt. It is on a second apron similarly agitated with which most mechanical diggers are fitted that most of the damage takes place. By this time the potatoes are free from dirt and are being bumped over the bars with no protection, and bruising is very common, although it may not be noticeable.

The digging of the crop before it is properly matured results in excessive skinning. Any damage to the tubers renders them liable to attack by the dry rot organism.

To minimise the damage caused by mechanical digging some growers take the precaution of putting strips of rubber (old car tubes) along each side of the frame to lay over the ends of the bars of the second apron, thus breaking the fall and throwing the potatoes more into the centre of the apron. Other precautions taken are the removal of the agitator roller and its replacement by a plain roller. If the earth is dry and the potatoes free from dirt when they reach the top of the first apron, the second one is removed altogether.

A further precaution is to ensure that care is taken in transferring the potatoes from buckets or baskets into the sacks, rough or careless handling at this stage also tending to bruise the tubers.

Damage During Pitting

Damage takes place during pitting by rough handling by dumping into the pit; allowing moisture to get into the pit by faulty covering and thus increasing the risk of frost injury; insufficient ventilation, or allowing too much dirt to get into the pit.

With the introduction of hay balers, another method of storing has come into vogue, growers using baled straw for the sides of their pits. This makes quite an effective pit, care being necessary to make certain that the covering over the top is proof against all weathers.

Revised Syllabus for Horticulture Diploma

THE syllabus and examination procedure for the certificates and diploma in horticulture of the Royal New Zealand Institute of Horticulture were announced recently.

Owing to considerable change in ideas on horticultural education in the last 20 years, the Royal New Zealand Institute of Horticulture, which was appointed an examining authority in horticulture in 1927, found it necessary to revise its syllabus and examination procedure. As the institute is a statutory body, the revised syllabus has had to be approved by the Government.

The diploma can be gained only by bona fide horticulturists who have been engaged in practical, private, or commercial gardening work for at least six years, although the first and second stages of the examination can be taken after a candidate has had only two and four years of experience respectively. The examination includes such subjects as chemistry, botany, and bookkeeping, as well as purely horticultural subjects.



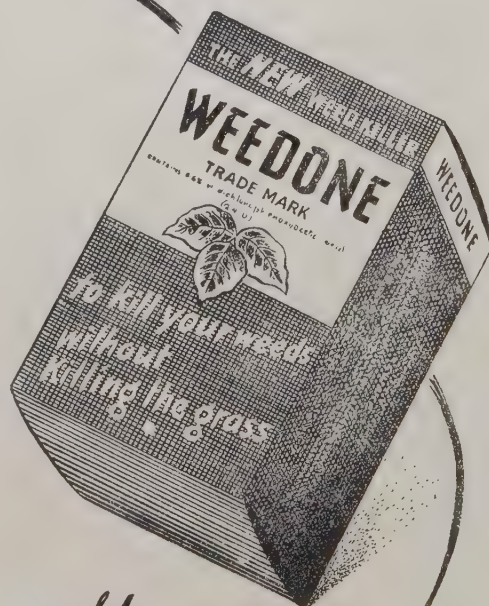
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THE HOME GARDEN IN JUNE

By A. G. KENNELLY, *Instructor in Vegetable Culture, Christchurch.*

THE results of proper planning in the home garden show up in June. The badly-planned garden may be devoid of vegetables, whereas a well-planned garden should supply a wide choice. Though the vegetables available may vary from district to district, a majority of the following should be ready for harvesting during the month: Root crops in variety, Savoy cabbage, broccoli (winter cauliflower), curly kale, brussels sprouts, celery, silver beet, spinach, winter rhubarb, leeks, and lettuce.

THE home gardener must now take advantage of every opportunity to clean up and dig over ground from which crops have been harvested, for if that work is left for the future, the weather may make it more difficult. Soil turned over now will benefit from exposure to the weather and be much more fertile than if left to be turned just before sowing or planting. Sound stakes should be cleaned and those that have outlived their usefulness burned, as they provide a winter shelter for insect pests and are often the means by which disease is carried over from one season to another. Collect fallen leaves, tender hedge clippings, and similar trash, and put them in the compost heap.

Garden Tools

The selection and care of garden tools is an important aspect often overlooked by the home gardener. Some thought on the subject not infrequently yields surprisingly good dividends in economy of labour and efficiency of work.

A clean, well-sharpened spade is infinitely better to work with than a dirty, blunt one.

A hoe with the blade wide, sharp, and set at the correct angle enables the gardener to destroy all weeds in one sweep instead of several when hoeing between rows of such vegetables as carrots, parsnips, and onions.

Though not always recommended by the most orthodox, the use of the garden fork instead of the spade in digging heavy, wet soil, and of the long-handled shovel in garden trenching is effective.

Garden shears should be properly set and sharpened. Sheep shears used for garden work are immeasurably better as working tools if ground to a knife edge than if left with a bevelled or scissor edge as when first bought; if a piece of cord, or preferably fine wire, is tied round the handle to prevent the blades from separating completely when open, they will be found far less tiring to the hand.

Use the right tools for the job and keep them sharp and clean.

Harvesting

Potatoes should be sorted over from time to time to pick out any which are going rotten. In districts where specially-early potatoes can be grown, tubers of a suitable variety should now be placed on the floor or in boxes in a light, airy, frost-proof shed or outhouse. That will enable them to acquire the greening of skins and the short, strong development of shoots which are important for early production.

Pumpkins and marrows: Only a few degrees of frost is sufficient to spoil pumpkins and marrows for long keeping. If they are not injured and do not come in contact with decaying matter, they will keep well in any dry, airy, frost-free place.

Root crops: In most districts root crops such as carrots, parsnips, beet-root, swedes, and turnips are best left in the ground to be dug as required—in fact, frost improves the flavour of parsnips and swedes. However, if limitations of space or unfavourable winter soil conditions enforce the digging of any of these vegetables, they are best pitted, which may be done in a number of ways. Probably the com-

monest method is to cover a heap of roots with a layer of straw and then a 2 to 3 in. layer of soil, leaving a small area of straw at the top of the heap uncovered for ventilation; a piece of tin over this vent will keep out the rain. A method suitable for small quantities is to bury the roots or plunge them in a layer of clean sand or fine coal ash in a shed or cellar. Before carrots, parsnips, or swedes are stored the tops should be cut off close to the roots but on beet-root it is better to leave from $\frac{1}{2}$ to 1 in. of tops to avoid bleeding.

Tomatoes: Except in a few specially-favoured districts, all outdoor tomatoes should have been harvested and the plants dug out and burned. Recently-harvested fruit which is mature but not yet coloured is best ripened by being packed in a case or box and placed in a warm room or shed. The widespread practice of exposing such fruit to the sun on window ledges or similar places often results in a high proportion of shrivelled or collapsed fruit. Only sound, reasonably-mature fruit should be packed, as fungal growths develop and spread quickly from injured fruit under storage conditions.

Sowing and Planting

Unless conditions are especially favourable, sowing and planting must proceed only with extreme caution. In most areas growth at this time of the year is so slow that there is a considerable risk that before growth is properly started the seed or young plants will fall victim of the many insects and parasitic fungi which inhabit the garden.

Broad beans: Though the time is becoming rather late, a sowing of broad beans made now will provide



[Sparrow Industrial Pictures Ltd. photo.]
A clean, sharp spade is better to work with than a dirty, blunt one.

a welcome addition to the limited range of vegetables available in early summer. Sow them 2 to 3in. deep in a double row with the beans zig-zagged 4in. apart and rows 3ft. apart. A quart of beans will sow 100ft. of row. The broad bean is a hardy vegetable and will withstand quite severe weather. Early in the season, some weeks before the beans are ready for shelling, the young tender pods may be sliced and eaten after the manner of French beans.

Cauliflower, cabbage, and lettuce: In districts which have a mild winter spring cauliflower such as the All-seasons variety, early roundhead cabbage such as Golden Acre, and lettuce such as Neapolitan may be sown. Elsewhere it is better to delay sowing, sow under glass, or sow in a specially-constructed frame in a warm situation. Plants from these sowings will be ready for setting out early in the spring.

Spinach, peas, radish, and spring onions: If the ground is well drained and the soil not too heavy and wet, sowings of spinach, radish, and spring onions may still be made. Peas of an early dwarf variety such as W. F. Massey, sown during the early part of June, will add variety to spring menus. It cannot be too strongly stressed that these crops should not be sown unless soil conditions are favourable; if there is doubt, it is better to wait until July or even August.

Established Crops

Standing crops such as broccoli (winter cauliflower), Savoy cabbage, and the earlier-planted spring cabbage will all benefit from inter-row cultivation with the dutch hoe or garden fork, provided care is taken not to damage the roots. Apart from the benefit, conferred by the destruction of weeds, the improvement in the aeration and drainage of the soil encourages root action and improves soil temperatures. Spring cabbage or cauliflower which are now making insufficient growth will benefit from the application of organic liquid manure, or of either sulphate of ammonia or nitrate of soda at the rate of 1oz. to 4 gallons of water.

Asparagus: Now that another gardening season has ended the fronds of asparagus have lost their green colour, as the sap has ceased to rise in the stalks. The change in colour which marks the stage at which the canes should be cut down will have been apparent for some time where the frosts and chill days of winter arrive earlier. Use a sharp knife and cut them to within a couple of inches of the ground. Then clear off all weed growth and fork in a good dressing of organic manure.

If it is intended to plant a new bed, it is advisable to make a start in June. Asparagus beds last for many years, and time and effort expended



[Sparrow Industrial Pictures Ltd. photo.]

Leeks are little troubled by insect pests or diseases and are suitable for filling the gap between the time the supply of winter greens is exhausted and the time the spring greens are ready.

in their proper preparation will be amply repaid. The bed should be 3ft. 6in. to 4ft. wide, and the ground deeply trenched and, if necessary, the site drained. A heavy application of organic manure should then be incorporated in the soil and perennial weeds removed. The surface of the soil is best left rough to expose it to the effects of the weather.

Broccoli should be watched for signs of approaching maturity. Apart from their hardness and the longer period required for them to mature, the principal difference between this class of cauliflower and the summer cauliflower is the fact that the broccoli is partially or wholly self-protecting: The outer leaves are sufficiently stout and long to curve over and so protect the curd from frost and, to some extent, rain and light. Winter cauliflower must therefore be watched as the curd develops to ensure that the outer leaves are giving the necessary protection. Should the curd be exposed, an inner leaf or two bent over or broken to cover it will give effective protection.

Leeks: Among the most accommodating of vegetables is the leek. It is little troubled by either insect pests or diseases and should now be reaching its full growth. It "stands" well, and if the supply of winter greens is likely to become exhausted before the spring greens are ready, a few leeks left now will be welcome later.

Rhubarb: Clean up, fork over, and manure the rhubarb bed, taking care not to injure the roots. Rhubarb is a gross feeder and responds well to liberal dressings of organic manure

at this time of the year. Where such manures are not available, well-rotted compost with the addition of a couple of handfuls of blood and bone to each crown is a good substitute.

June is the best month in which to start replanting or extending a rhubarb bed. Dig the roots out with a strong, sharp spade, and after removing most of the adhering soil place them in a shady site where they are not exposed to drying winds. They will not suffer from this treatment and may be left safely until the development or shooting of the buds indicates planting time. Each bud cut from the clump with a good piece of root adhering to it will develop into a plant if set out. Preparation on the site of the intended bed may also be started, and if it is now dug over, heavily manured, cleaned of all weeds, and if necessary drained, all will be in readiness for planting time.

Pests and Diseases

Slugs are sometimes troublesome at this time of the year, particularly among spring and winter cabbage, and are sometimes rather difficult to control. Methods recommended by D. K. Pritchard, late Instructor in Vegetable Culture, Department of Agriculture, are "to use a bait of bran in which the active ingredient is metaldehyde. There are proprietary preparations containing this active material, and these will usually give satisfaction. Paris green bait may also be used; it is prepared by mixing 1½lb. of bran with 1oz. of Paris green (arsenic compound). Dissolve ¼ pint of molasses or treacle in 1½ pints of water and mix

this with the bran and Paris green. Spread the mixture broadcast in the evening over the affected area. This amount is sufficient for 200 square yards and should be used within a day or so, because it becomes mouldy if stored. Another measure is to broadcast hydrated lime in the evenings when the slugs and snails are out. A mixture of dehydrated copper sulphate (bluestone) and hydrated lime (1 part and 9 parts by weight) may be dusted, also in the evening. To dehydrate the bluestone first grind it to a powder and then heat the required amount in a tin over a fire until the material becomes a powder that is almost white; then mix in the lime and dust it over the area. A simpler and reasonably effective measure is to powder some bluestone and mix with it an equal weight of hydrated lime; broadcast this mixture at the rate of 1 lb. to 10 square yards.*

Little trouble is now to be expected from either the diamond-backed moth or the white butterfly, but aphid infestation is still likely to cause trouble. The aphid most commonly found on brassica crops (such as turnips, cabbages, brussels sprouts, and cauliflower) is the grey aphid (*aphis brassicae*). It seems to be comparatively hardy and may be seen on those crops during even the coldest part of the year. Fortunately, it is easily controlled by spraying it with nicotine sulphate, plus an activator, which is usually soap. The spray is made up as follows: Dissolve 2oz. of soap or soap powder in hot water and add it, with 1 fl. oz. of nicotine sulphate, to 4 gallons of water. The spray should be applied in still weather, preferably at the warmest part of the day, and at intervals of about 10 days.

If the roots of brassica develop large swellings (club root), that is an indication that the soil is too acid, as alkaline soils inhibit the disease. The remedy is a dressing of 4oz. of carbonate of lime to the square yard applied annually before planting, which should suffice to keep the soil in suitable condition, but after a bad attack of club root it is advisable to apply 8oz. to the square yard. However, the cure is not usually effective immediately because of the impossibility of mixing the lime and soil completely while the crop is still growing.

Purposes of Manuring

This is a good time of the year to check over manure supplies and make necessary replenishments. Particularly does that apply to organic manures, which are best dug into the ground before the crop is established. Stable or farmyard manure is the best basic manure of that type but blood and bone or dried blood is also valu-

* "Vegetable Growing in the Home Garden," by D. K. Pritchard, 6d., post free, from offices of the Department of Agriculture.

able; for crops which require heavy manuring it can be applied at rates of up to 8oz. a square yard, but for general purposes 1½oz. is adequate.

Though organic manures are best for improvement of the quality and fertility of the soil, the artificial types, if correctly used, can be a great asset to the garden. The secret of success with them is to know how much and when to apply them. Too much is worse than too little. Following are the purposes and safe ranges of application of the commonly-used fertilisers:—

Phosphatic manures provide fruitfulness for early ripening, root growth, and seed production. An example is superphosphate, which should be applied at 1 to 4oz. a square yard.

Nitrogenous manures increase growth, give a darker colour to the foliage, and delay maturity. Examples are sulphate of ammonia and nitrate of soda (½ to 1oz. a square yard).

Potash manures improve quality and resistance to disease; they are important in the production of woody tissue. Examples are sulphate and muriate of potash (½ to 1oz. a square yard).

Storage of Manure

Without adequate storage facilities it is inadvisable to buy manures that are not to be used at once. That applies particularly to artificial manures. They should be stored in a dry place, and except in ideally-dry situations they are best supported an inch or two above floor level to enable the air to circulate about them. Under damp conditions most of them readily absorb moisture and quickly harden, often to a rock-like consistency which must be broken down before use. That not only detracts from their value but often rots the sacks which contain them. Small quantities of artificial manure can be safely stored in stout, properly-lidded tins, but when not in use the tins must be kept closed to exclude moisture.

Storage conditions for most organic manures are less exacting. Manures such as dried blood or blood and bone do not deteriorate to the same extent from the absorption of moisture from the air, but they are much easier to handle if kept dry. If they become thoroughly moistened, they sometimes start to deteriorate, and their consequent stickiness and attraction for flies make their application to the soil an unpleasant task. When stored outside, fowl manure, and to a less extent horse and farmyard manures, should be covered if they are not to be used immediately. If subjected to the leaching effects of heavy rain, they are likely to lose much of their most valuable properties.

... THE HOME GARDEN IN JUNE

Test for Lime Content

The question of whether to apply lime to the soil, and if so how much, is of perennial interest to the home gardener. Most New Zealand soils are said to be deficient in lime, and many have a pH value of 5.5. The pH value may mean little to the average home gardener, but a knowledge of it is sometimes of use when reading gardening literature. Briefly, the pH table of values is as follows:—

pH	Type of Soil
4.5 and lower	Very strongly acid.
4.5 — 5.2	Strongly acid.
5.3 — 6.4	Medium acid.
6.5 — 6.9	Slightly acid.
7.0	Neutral.
7.1 — 7.5	Slightly alkaline.
7.6 — 8.2	Medium alkaline.
8.3 — 9.0	Strongly alkaline.

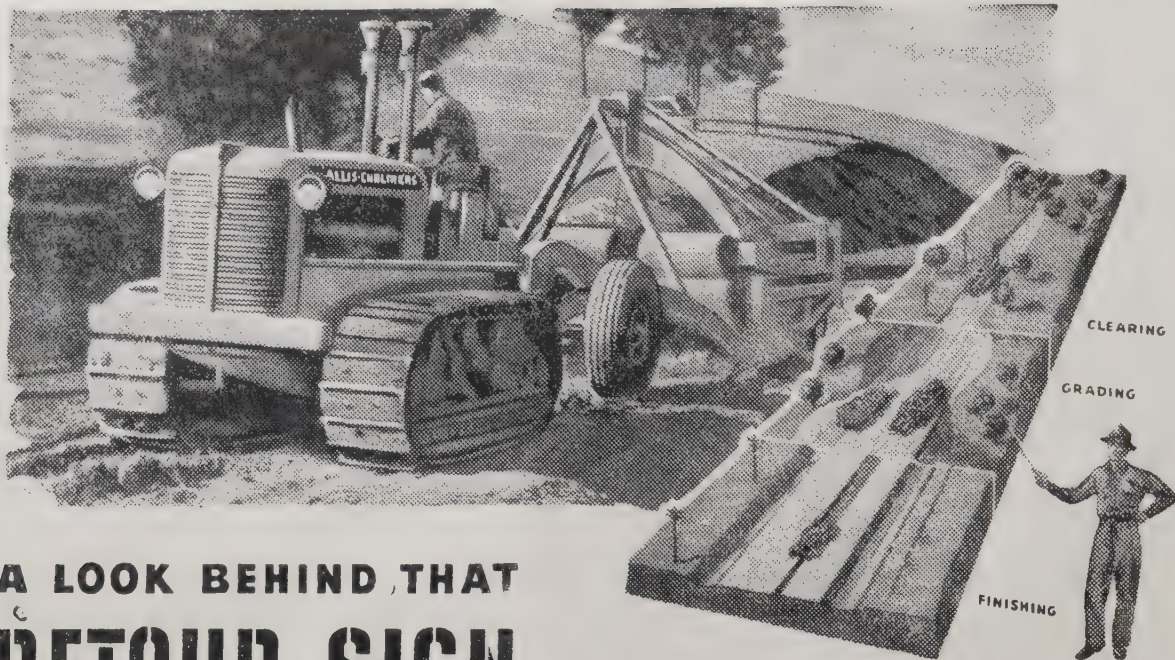
Each decrease of 1 unit in pH value represents a tenfold increase in acidity.

Most vegetable crops respond well to a neutral or slightly-acid soil, and there are a number of ways by which the home gardener can determine whether his soil needs lime. Probably the simplest is that recommended by the Royal Horticultural Society: Take samples of soil from several parts of the garden to a depth of 9in. and mix them thoroughly. Put a part of the mixture in a glass or cup, mix it to a thick paste with a little water, and add a teaspoonful of spirits of salts (hydrochloric or muriatic acid). If effervescence occurs, there is sufficient lime in the soil; if not, lime should be added.

The amount of lime to apply is governed principally by the soil type and the locality, and no hard-and-fast rule can be laid down. Light, sandy soils usually require less lime than heavy soils. An annual dressing of 2 to 3oz. to the square yard is generally adequate for medium soils, but in areas of high rainfall, where the lime is rapidly leached out of the soil, heavier dressings are required.

How to Pack and Forward Relief Goods Overseas

Individuals and members of organisations who send goods overseas for the relief of distress are often uncertain about what goods are most wanted and how to pack them. They will find full instructions in an attractive "Relief Supplies Handbook" which is obtainable from CORSO, P.O. Box 11, Government Buildings Post Office, Wellington. After briefly pointing out that the responsibilities which New Zealanders have undertaken toward the relief and rehabilitation of China become more important as UNRRA closes down, the handbook describes the sorts of home-made or home-found goods which are most urgently needed in both China and Greece—used clothes and footwear, wool, fat, school supplies, toys, spinning wheels and looms, and, of course, food. The handbook also shows how to pack and prepare these goods for transport and to what depots to send them.



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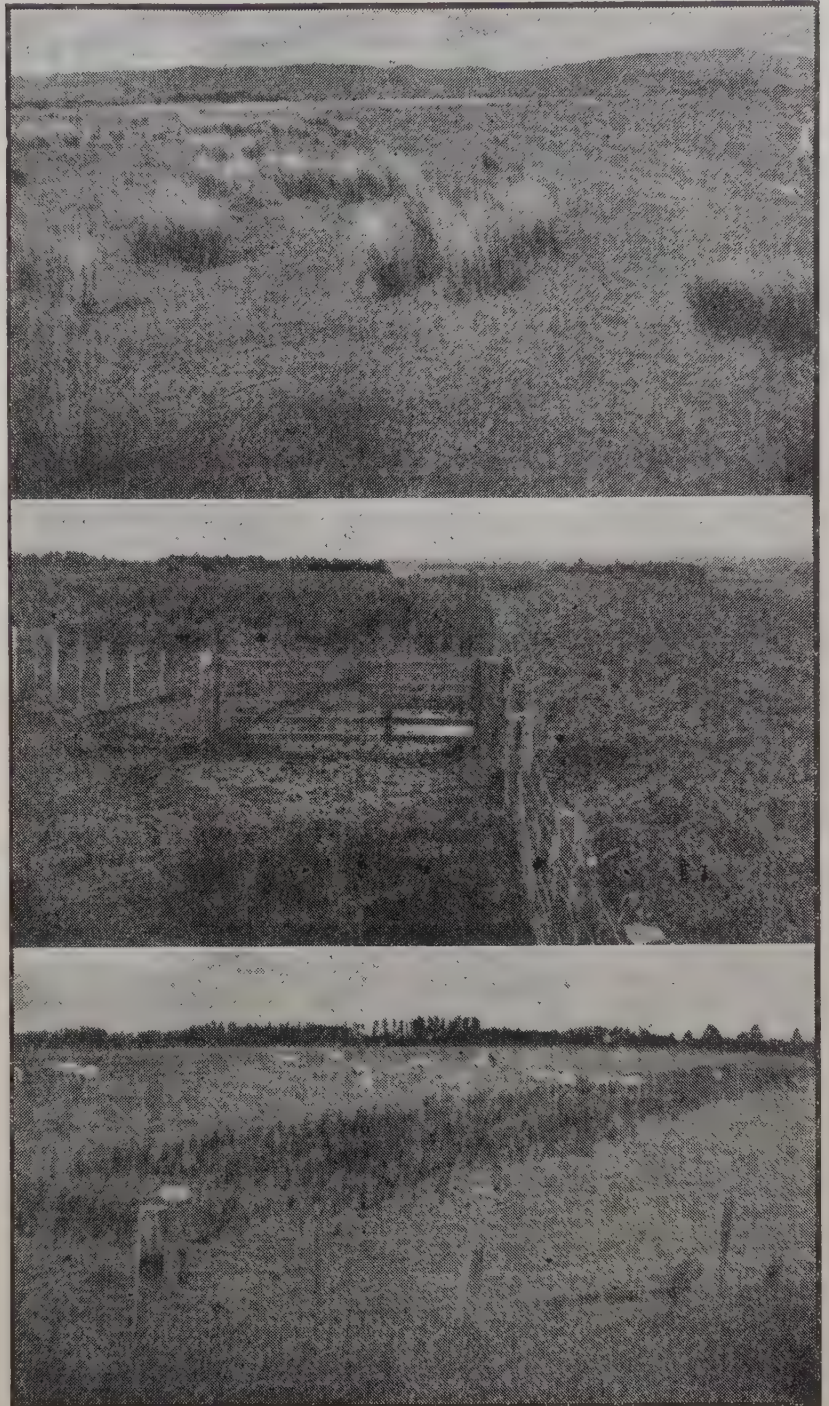
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CONTROL OF RUSHES IN PASTURES

THE appearance of rushes in a pasture usually indicates swampy or badly-drained land. The steps to be taken to control the growth of rushes by improving the land and so encouraging better pasture establishment are discussed in this article by D. M. E. Merry, Instructor in Agriculture, Nelson.

THE family *Juncaceae*, to which the true rush belongs, includes about 280 species throughout the world, but of these probably less than a dozen are of economic importance to the New Zealand pastoral farmer. Some of these are annuals such as *Juncus bufonius*, the toad rush, a small branched species growing about 6in. high and found in wet hollows of pastures or cropping land. Probably the most common rush of all, *Juncus polyanthemos*, is a perennial 1½ to 3ft. high forming dense tufts of wiry stems and growing in swampy or poorly-drained soils. Another rush-like plant which grows vigorously and spreads aggressively on sandy, coastal soils is called *Scirpus nodusus* and is a member of the *Cyperaceae* family to which the sedges belong. Rushes have few virtues and, apart from the succulent annual species, they are disliked by stock; they have neither scent nor nectar, and no particular attraction; they shade or occupy land, displacing pasture. In one North Auckland area they are suspected of having sheltered a heavy population of nymph ticks throughout the winter and provided a vantage point from which the ticks could attach themselves to cattle in the spring. However, rushes do provide some shelter at lambing from bleak winter winds, and not long ago they were an asset for the now-dying art of stack thatching. Clumps cut from nearby paddocks have been used in dairying districts to retain the earth loading on stacked silage.

The popular conception that rushes are only wet-country plants is not entirely correct, although drainage is normally a necessity for their control. Rushes are sometimes seen on dry positions or land which is seasonally wet, and they establish easily on worn-out, open swards. Most species require particular conditions for growth. For example, *Juncus maritimus*, the common rush seen along the shoreline of tidal estuaries, favours brackish water, whereas the other species are to be found only in wet, non-saline conditions.



Upper—The effect of drainage. Rushes growing freely on the flats and few, if any, on the better-drained slopes. Middle—The land on the left of the fence has been regrazed and dense masses of rushes have thus been allowed to establish. On the right, where grazing has been light, no rushes appear. Lower—The result of sowing the wrong seeds mixture. The central strip was sown with a grass which, unlike the grass on either side of the strip, did not form a sward sufficiently dense to prevent the re-entry of rushes.

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Adequate Drainage Necessary

The first factor in rush control is adequate drainage. Surface drains are often only partially effective in permanently lowering the soil water-table, and where mole or tile drainage or a combination of both has been practicable good results have generally been obtained. The Manawatu district offers excellent examples of this method of control.

Secondly, the wet, acid conditions in which rushes thrive are just those which the better grasses and clovers dislike. For this reason the aim must be ploughing and aeration of the soil together with liming to prepare the land for high-grade pastures.

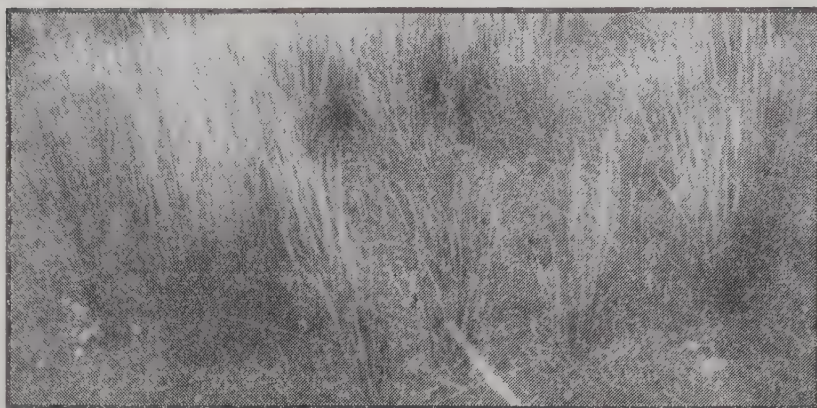
Thirdly, when good grass land has been established, subsequent management is a most important factor. Overgrazing and winter poaching with cattle, as against rotational sheep grazing, are a prime cause of rush re-establishment. Invasion by rushes may also occur because pasture establishment is so poor that rushes are able to establish with little or no competition.

Swamp Ploughing

Swamp ploughing, if practicable, offers the best method of turning under rushes and ensuring their decay. The rush rhizomes—the underground portions apart from the true roots—from which the above-ground stems grow are about 2 to 3 in. below the soil surface. These usually form dense rush tufts (although in old pastures a ring of growth with grass within is common) caused by the interior of the tuft naturally dying out as the rhizome perimeter extends. Rushes are very deep-rooting plants, but fortunately if the rhizome is severed and turned under to about 9 in., there is no trouble from regrowth, provided subsequent cultivation does not disturb the rhizomes. It is imperative therefore that the first ploughing be deep and later working shallow.

In the Manawatu successful rush control has followed swamp ploughing in June or July, after which the ground has been worked down for sowing to rape, swedes, or choux moellier in November after a liberal dressing of agricultural lime. This cropping has been followed on in the next season with oats and barley or barley, oats, and tares for hay so that the ground could be cleared and reworked for sowing to pasture in late February. The advantages of two seasons' cropping are: First, time is given for the turned-under rushes to decay and the ground to consolidate; secondly, young rushes striking from seed are checked; and thirdly, surface cultivation levels out depressions and hollows in which water may lie after rain.

CONTROL OF RUSHES IN PASTURES



Typical rings of growth in old rush paddocks as the crown of the original rush dies and growth extends out from the perimeter.

When the ground is suitable for sowing to grass the best seeds mixture is one likely to give a fairly rapid cover and succeed under conditions probably wet at some time of the year. The following is a typical mixture for these conditions:—

	lb. per acre
Perennial ryegrass (Certified seed)	16
Italian ryegrass	4
Cocksfoot (Certified seed)	9
Timothy	3
Meadow foxtail	2
Dogstail	2
White clover (Certified)	2
Alsike	2
	—
	40
	—

Carbonate of lime up to 1 ton an acre should be applied when the seed is sown or shortly after, and quick grass establishment is assured with a phosphatic topdressing at sowing.

The permanent lowering of the soil water-table as a rule is necessary if rushes are to be prevented from re-establishing. Rushes are very free-seeding plants, the seed is dust-like, and no doubt it can be borne considerable distances by wind or sheep fleece or in mud attaching to the hooves of stock. Where mole draining is possible it should be carried out in the second winter following the season of sowing, as the ground will then be firm enough to carry tractor and plough without causing undue pasture damage. Drain outlets should be connected through tiles, and the mole plough set to cut channels 15 to 18 in. deep. In suitable ground these drains will remain effective for many years, ensuring complete rush control.

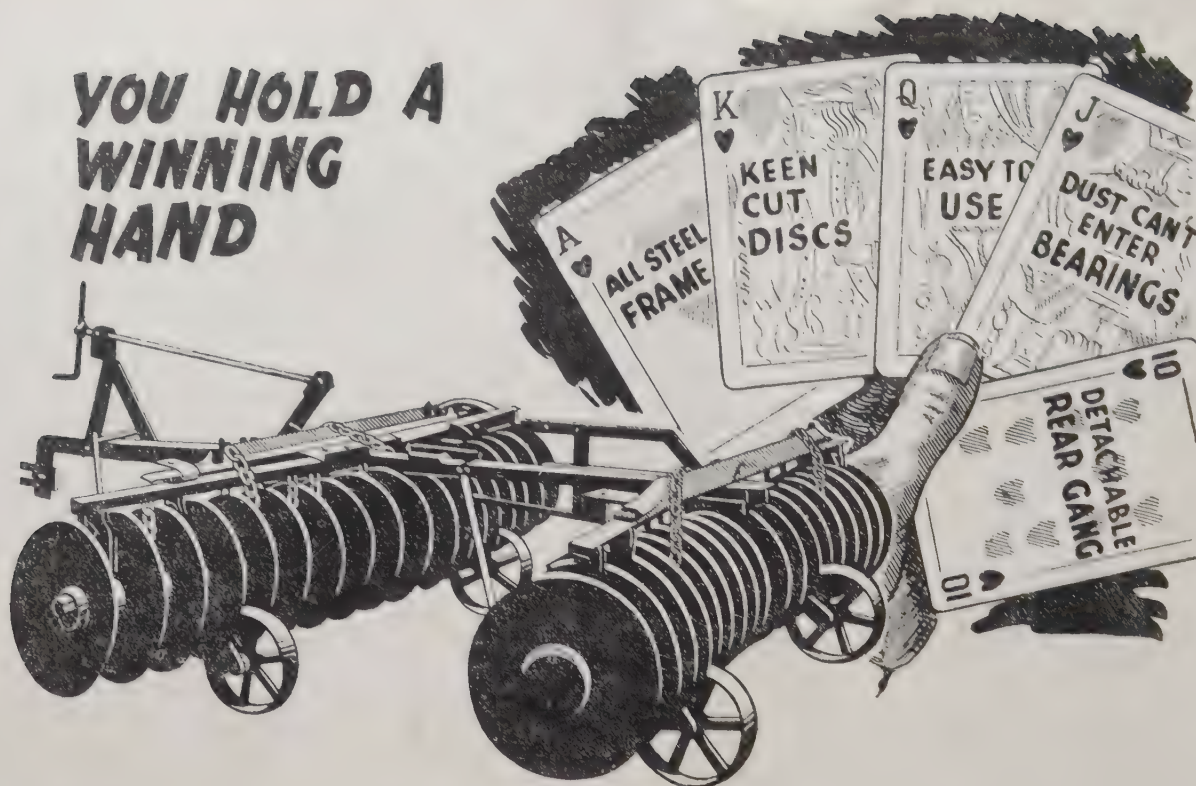
Chipping and Burning

Where ploughing is not possible attention should be paid first to drainage. Next, the rush clumps should be

chipped out, preferably by two men working together with sharp spades. This operation is best done in the early season (September) while the ground is easily cut and before the current season's rush seed has set. The clumps should then be gathered into heaps, dried, and later fired. Oversowing the bare patches with a suitable mixture as has already been described is recommended. In very wet places *Lotus major* is a valuable addition, as it grows well under extreme conditions. Mowing as a means of control has in some cases given useful results. These results seem to depend a good deal on the time of mowing, and the exact season to exercise maximum control may have to be worked out for different districts. Very good results have been obtained by mowing at flowering time, but exact, comprehensive information on this point is not available. Mowing as closely as practicable has given good results, but more than one mowing is usually advisable. After cutting, rushes make the greatest regrowth in the Manawatu from September to January, and successive cutting over these months is likely to weaken old plants more than at other periods of the year. Liming and topdressing should follow any cutting in an endeavour to strengthen the sward, and care should be taken to prevent winter overgrazing and poaching of the soil surface by cattle, as these conditions encourage the establishment of rushes and cause the failure of pasture. Chemical control of rushes by weedkilling sprays or burning off with weed burners is unsatisfactory.

Rushes are an indication of unsuitable conditions for pastures and until the cause is corrected permanent relief or control is unlikely.

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DANGERS OF FARM MACHINERY

Many Accidents Occur Through Failure to Take Precautions

By the Inspection of Machinery Branch, Marine Department, Wellington.

POWER-DRIVEN machinery on New Zealand farms has caused many deaths and serious injuries, particularly to young children. Though the farmer recognises the machine as a willing slave, as shown in the enormous growth in the number of power plants in the past 20 years, he has not, in many instances, perceived the risks of mutilation and death to which farm machinery exposes him, his children, and his employees. Yet every farmer instinctively realises that a bull is a potential danger and he does not neglect to confine the animal so that it cannot harm human life. It is the purpose of this and following articles to draw the attention of dairy farmers, sheep farmers, agriculturists, and orchardists to the danger inherent in power-driven machinery, and to indicate practical means by which the risk of accident may be reduced.

NEW ZEALAND farmers have always had a progressive outlook on the advantages of power-driven machinery in farming processes. Beginning with the simple water wheel, they successively adopted the steam traction engine, kerosene and petrol stationary engines, the stationary diesel engine, the electric motor, and the modern diesel tractor.

Table I below shows the growth of the use of farm machinery from 1922 to 1942. Milking plants in 1942 were 2½ times as numerous as in 1922, tractors 34 times, shearing plants twice, threshing machines thrice, and electric motors 84½ times as numerous. The remarkable growth in the use of electric motors on farms has naturally checked the increase in the use of the internal combustion engine.

Table II shows that power units in use on farms in 1942 were 5½ times as numerous as in 1922.

Labour shortages, increased labour costs, and the demand for increased farm production make it certain that the application of power machinery will continue to increase rapidly in the near future in all phases of agriculture where it can be harnessed to do a job of work.

TABLE I—Farm Machinery on Holdings over 1 acre Outside Boroughs

	1922	1927	1932	1937	1942
Milking plants	12,486	17,090	23,222	27,331	31,487
Cream separators	38,861	45,246	51,334	56,850	54,107
Agricultural tractors ..	412	2,588	4,856	6,585	13,967
Shearing machines—					
plants	5,468	6,305	7,853	8,867	11,555
stands	17,788	19,269	22,326	24,229	28,611
Threshing machines	390	364	504	656	1,129
Electric motors	778	8,436	24,164	40,201	65,699
Internal combustion engines	17,551	18,885	20,974	22,358	23,882

Most Accidents Preventable

Farm machinery in New Zealand takes a bigger annual toll of life and limb than do dangerous farm animals. The risks are greater because machinery is often not suspected by users to be dangerous, and the injuries inflicted are often more sudden and more terrible.

It is a sad fact that in most accidents with farm machinery the victims are children under six years old, most of whom are killed. That tragedy is crowned by the irony that most of the accidents are preventable by simple precautions which can be taken by the handy farmer.

How Accidents Happen

Here, briefly, are the stories of how a few typical farm-machinery accidents happened:—

A boy of 4 years became entangled in unguarded shafting of milking machine; fatal results.

A girl of 3 years had her clothing

TABLE II

	1922	1942
Agricultural tractors ..	412	13,967
Electric motors	778	65,699
Internal combustion engines	17,551	23,882
Totals	18,741	103,548

caught in a coupling of a cream separator; child killed.
A boy was pushed accidentally on to a farm circular saw; fatal results.
A man was entangled in revolving shafting of a power tractor; fatal results.
A girl of 6 years had an arm caught between pulley and belt of milking machine; arm amputated.
A girl of 16 years had her hair caught in belting; half her scalp was torn off.

Revolving shafting and belting account for many accidents and their danger cannot be overestimated. Loose clothing, for example, an apron, coat end, or ragged sleeve, may wrap round the shaft, even if the speed of the shaft is relatively slow. Before the wearer is aware of what has happened he or she may be whirled round, and either killed outright or terribly injured. The hair of girls and women when worn loose has been caught on shafting on many occasions; sometimes the unfortunate person involved has been completely scalped, at others results have been fatal.

There is a common impression that a smooth shaft is fairly safe but that is quite erroneous, as accidents occur frequently at parts of shafting where there are no projections. Projections on the shaft or its mountings, such as fixing keys and screws, bolt heads, couplings, and clutch fittings, add to the danger, as they may catch a garment. It is desirable, therefore, that shafts should have as few projections as possible, but that does not eliminate the serious risk from the shaft itself or from pulley arms, belts, chains, and clutch links.

Unguarded Belts

Moving belts cause many accidents. If caught by a heavy belt, the victim may be entangled on and carried round the shaft, but more frequently he or she is trapped at the point of intake of the belt with the pulley or injured by a blow from a projecting fastener at the belt joint.

A Wairarapa sheep farmer was killed recently while sharpening shearing-machine cutters on a power grinder, his head coming in contact with a driving belt behind him. He was thrown forward on to the grinder so that his throat came into contact with the revolving disc, his windpipe and gullet being severed. Neither the belt, the primary cause of the accident, nor the grinding disc, which was the immediate cause of the farmer's death, was guarded. The driving belt has since been re-arranged further from the grinder, and it has been guarded; the grinder disc has also been guarded.

The spokes or arms of wheels and pulleys cause accidents by direct blows or by guillotine action with fixtures, and projecting fastenings at the joints

DANGERS OF FARM MACHINERY . . .

of split pulleys can inflict serious injuries. The risk at the inrunning side of toothed gear wheels is generally understood, but accidents do occur at gear intakes.

Chain drives are capable of inflicting serious bodily injury. A chain-driven honey pump without guards over the chain wheels is shown in Fig. 1. Though the power unit is a small



Fig. 1.

electric motor of $\frac{1}{2}$ horsepower or less, the chain gearing can mutilate a hand or drag hair from a scalp.

The dangers of transmission machinery are greater at high speeds, but slow-running machinery is not free from risk and those working with it must be equally careful. Fatal accidents have happened at shafts running very slowly (even $5\frac{1}{2}$ revolutions a minute) and they emphasise the need for suitable precautions.

Many accidents occur in starting up new transmission machinery before the safeguards known to be necessary are installed, or because safeguards provided are inadequate, or though originally adequate they have been removed or allowed to become ineffective. The unexpected starting of machinery because of defects in pulleys and stopping and starting appliances also leads to accidents.



Fig. 2.

Circular Saws

Circular saws are extremely dangerous. In the experience of the Inspection of Machinery Branch of the Marine Department over a long period circular saws have caused more accidents than any other class of power-driven machinery. Circular saws on farms, used principally for cutting firewood, frequently cause accidents to farmers, and their families, and employees. Circular saws require careful guarding, yet many farm saws are not guarded in any way.

The dangers arising from the unguarded saw in Fig. 2 are:—

1. The top and back cutting edges are unnecessarily exposed.
2. The underside is not almost wholly encased as it should be. (This part is obviously very dangerous if there are small children about.)
3. There is no "riving knife" or fin at the back of the saw to open the saw cut and prevent the saw being jammed. Many operators are struck by pieces of timber hurled from a saw not fitted with such a fin. This fitting is sometimes termed a "spreader."

Cracked saws have been the cause of numerous accidents, permitting a fragment of the saw to fly off with great violence and strike the operator. Cracked saws should not be tolerated or repaired, but should be discarded forthwith.

Preventing Accidents

Machinery accidents arise from two main causes: The exposure of dangerous parts, and unsafe or reckless practices by persons using machines or in the vicinity.

All power-driven machinery over 1 horsepower not used on farms must comply with the Inspection of Machinery Act and is inspected annually. When a machine appears to offer any avoidable risk the inspector advises the owner what guarding will be necessary. But farm machinery the motive power of which does not exceed 6 horsepower is exempt from Government inspection, so the responsibility for guarding most or all of his dangerous machinery rests on the farmer alone. Following are simple methods by which the farmer may guard against the common hazards likely to arise from power-driven farm machinery:—

Fencing transmission machinery to make it safe for those who have to approach it is of the greatest importance. The fencing should be so constructed as to prevent inadvertent contact of any part of a person or clothing with the running machinery.

The machinery may be satisfactorily fenced off with stout rails of metal or wood, or metal tubing, provided it is placed at such a distance that contact with the moving parts is impossible. Normally, in factories where adults are employed there are two rails at heights of about 3ft. 6in. and 1ft. 9in. from the floor or other standing level, the rails being fastened to substantial

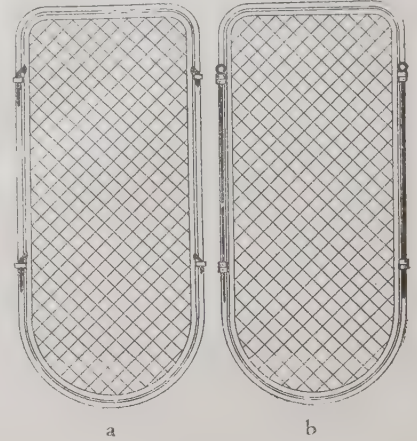


Fig. 3.

fixtures. That is fairly effective with adults and where there is no need to approach the machinery inside the guarding, but where children can get access to such plant as milking and shearing machinery the simple post-and-rail guard is not adequate and complete enclosure of shafting, gearing, pulleys, and other dangerous parts is essential.

Complete enclosure may be effected by guards of stout wire mesh, expanded metal, sheet metal, wood, or

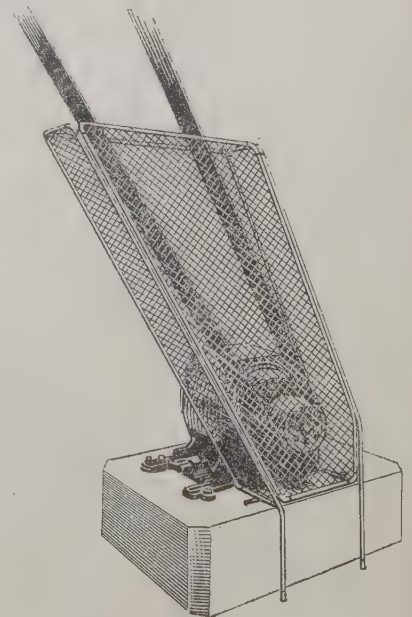


Fig. 4.

other suitable material of ample height, securely fixed to cover belts, wheel and pulley arms, and in-gathering teeth of gear and chain wheels. Strong wire work of close mesh is best. Wire-work guards should be constructed of neatly-designed panels secured to a strong metal framework of welded or screwed metal tubing. For convenience portions may be removable. Simple fastening devices for

DANGERS OF FARM MACHINERY



Fig. 7.

of course, be guarded by a wooden guard if wire mesh were not available.

Small guards: In addition to general fencing, details of farm machinery should sometimes be further protected by small guards secured to the gear and revolving with it: For example, key heads and collar-fastening screws may be fitted with cover guards of hard wood (Fig. 5); metal couplings with projecting bolt heads and nuts may be fitted with wooden discs made in halves and screwed together, the

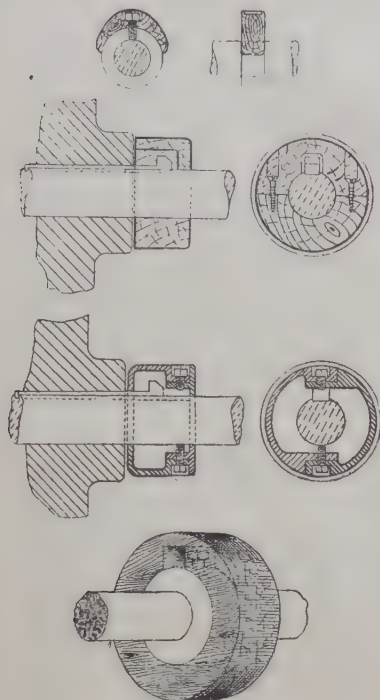


Fig. 5.

such parts may be short hooks which drop into rings on the fixed parts of the guard (Fig. 3 a) or locking rods which fit in to aligned rings (Fig. 3 b).

Wire work of this kind can be made readily in most country towns from simple measurements or patterns supplied by the farmer. In the larger towns there is usually at least one firm of wire workers accustomed to the manufacture of wire-mesh machine guards. Fig. 4 shows a typical wire-mesh guard for an electric motor and belting. The top of the guard should be not less than 6ft. 6in. above the floor level. This motor and belt could,

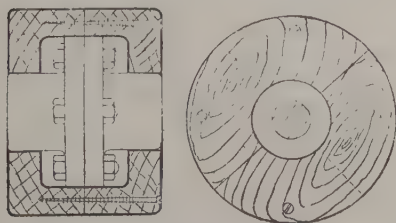


Fig. 6.

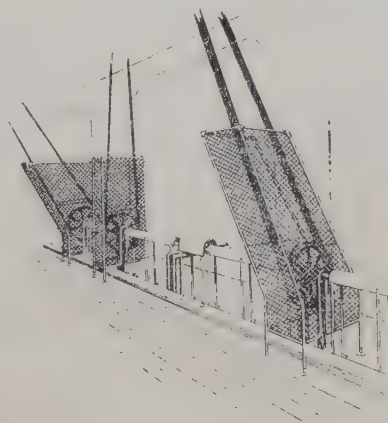


Fig. 8.

disc enclosing the entire coupling (Fig. 6); a wide sheet-metal band may be screwed to end discs of wood of the same diameter as the flanges of the couplings (Fig. 7); pulley spokes may be protected with circular metal discs made in halves and strongly secured by fastenings which have no dangerous projections.

Shafting may be effectively guarded by providing for each length a corresponding length of guard, the mountings, such as pulleys, being separately guarded (Fig. 8). Fig. 9 a shows a length of overhead shafting protected

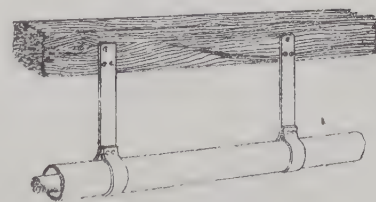


Fig. 9 a.

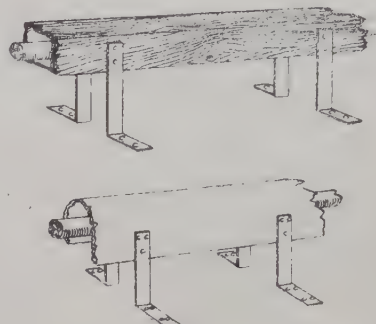


Fig. 9 b.

by a tubular guard of sheet metal. Fig. 9 b shows lengths of low shafting protected by an enclosing wooden box-guard and by a deep, sheet-metal, inverted trough guard. The depth of the trough in Fig. 9 b beyond the shaft is sufficient to make it equivalent to a complete enclosure guard, but the shallow trough guards in Fig. 10 a are not satisfactory. The incomplete guards in Fig. 10 b are also inefficient safeguards; they do not prevent the possibility of loose clothing or hair coming into contact with the shaft.

Collars and couplings: Shaft guards of the fixed type can be suitably enlarged at collars and couplings, or separate guards may be provided (Fig. 11), the shaft being independently protected.

Pulleys: Close guarding of low pulleys is illustrated in Figs. 4 and 8. The guards in all cases should protect the adjacent parts of the belt, in particular where the belt runs on the pulley. Pulleys near floor level or slightly overhead are particularly dangerous because of the risk of trapping at belt intakes. Fig. 12 shows an overhead pulley guard.

Belt fasteners: Where moving belts are not completely enclosed care

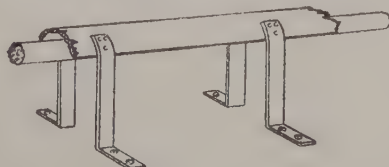
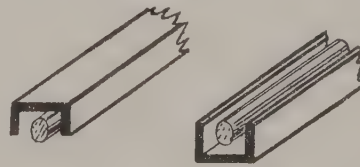


Fig. 10 a.



DANGERS OF FARM MACHINERY . . .

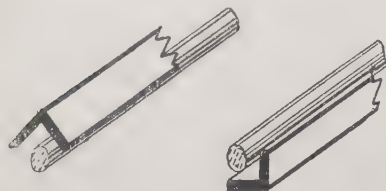


Fig. 10 b.

should be taken to avoid loose ends or metal fasteners with dangerous projections which are likely to cause accidents, such as the case of the Wairarapa sheep farmer.

Chain drives: The best guard for a driving chain is a complete, oil-tight casing of sheet metal or cast iron.

Gear wheels: Toothed wheels should be encased in metal guards with at least the teeth and rims fully protected. A portion of the guard may be hinged or sliding to facilitate lubrication. Partial guards for gear wheels (Fig. 13) are inadequate and may be dangerous.

Circular saws: The extreme danger which can arise in the use of improperly-guarded circular saws has already been mentioned. A future article will describe and illustrate how circular saws should be guarded.

Safety Practices

Accidents with power-driven farm machinery can often be avoided by observing safety practices based on common sense, prudence, and a constant appreciation by the farmer of the potential dangers of any machine.

Children cannot be expected to appreciate the dangers of machinery and are likely to run risks either from thoughtlessness or from a sense of mischief. Therefore it is essential that they should be protected by all possible means from exposure to risk of accident. But it is not sufficient that the guarding of the machine should be as effective as possible; in the case of a circular saw, in particular, it is impracticable to remove all hazards even by the most complete system of guarding. It is important, therefore, rigorously to forbid children and other unauthorised persons to enter machinery enclosures or unnecessarily approach

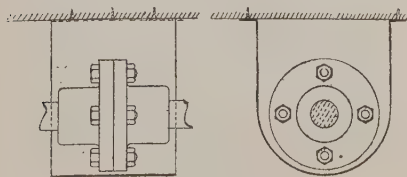


Fig. 11.

or interfere with machinery. In one of the examples quoted earlier a boy was pushed by another, in horseplay, on to a revolving circular saw and fatally injured.

Where children must work in milking sheds they should not be permitted to start or stop the milking machine, nor should they be allowed to oil or adjust the engine, vacuum pump, or separator. Suitable clothing is also important, as unsuitable clothing has been the cause of many serious machinery accidents. Loose sleeves and, particularly, uncovered hair worn long and loose by girls and women have caused the loss of limbs and even of entire scalps.

Clothing should be tidy, with close-buttoned sleeves or short sleeves above the elbow. Coat tails and loose and ragged clothing are dangerous. Hair should be confined in a mob cap—even women's short-cut hair is dangerous if not covered. An accident recently to a youth whose hair was caught in the stock bar of a lathe illustrates the danger of any cut of hair when exposed to running machinery. The

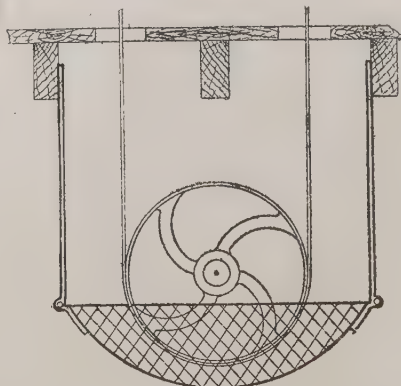


Fig. 12.

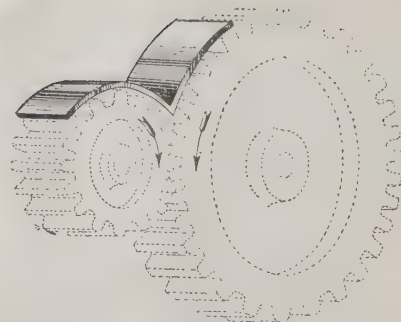


Fig. 13.

boiler suit or battledress types are safety clothing which can be recommended. The floor or ground near power machinery should be free of oil or other slippery material. Sawdust and wood chips around circular saws may cause the operator to lose his foothold; many accidents to fingers and hands are attributable to operators slipping. Where there is a wooden floor at the saw bench it is a good plan to nail slats on the floor to improve the foothold. Around machinery used in the open the ground should be kept clear of rubbish and other matter likely to trip the operator or make him slip.

Power hay presses driven by belt from a tractor are potentially dangerous because of the glazing of boot soles on the hay field.

Machinery should never be cleaned or oiled while it is in motion. Belts should be put on pulleys only when the power is off. Guards removed to repair, adjust, oil, or clean machinery should always be replaced properly before the machine is used again.

To sum up: Play safe with machinery by effectively guarding all dangerous parts and keeping yourself and others away from machinery in motion.

Radio Broadcasts

RADIO talks to farmers will be given from Station 1YA, Auckland, at 7.15 p.m., on the following dates:—

June 9—"Current Farming Problems," by J. E. Davies, Instructor in Agriculture, Hamilton, and G. L. Banfield, Assistant Instructor in Agriculture, Hamilton.

June 16—"Care and Management of Breeding Stock," by H. A. Kitto, Poultry Instructor, Auckland.

June 23—"Young Farmers' Club session by a representative of the Mata-mata Y.F.C. District Committee.

June 30—"Pasture Progress," by S. H. Saxby, Agrostologist, Wellington.

Under the auspices of District Pig Councils broadcasts will be deliv-

ered on the following dates in June:—

Auckland—1YA, on June 18, at 7.15 p.m., "Housing and Sanitation," by H. Preston, Supervisor, Northland District Pig Council.

Dunedin—4YA, on June 9, at 7.15 p.m., "Some Problems in Pig Raising," by M. McDonald, Supervisor, Otago District Pig Council.

Palmerston North—2ZA, on June 20, at 7 p.m., "Care of Litters Before and After Weaning," by L. Marsdon, Supervisor, Wellington District Pig Council.

Napier—June 12, at 7.15 p.m., "District Pig Councils—How they Can Help You," by H. Hopkins, Supervisor, Tairāwhiti District Pig Council.



NEW ZEALAND'S BUTTERMAKING INDUSTRY

By D. HULL, Dairy Instructor, New Plymouth.

BUTTER is uppermost in the scheme of dairy production in New Zealand. The return from its manufacture at present is nearly £30,000,000 a year, representing about 140,000 tons, of which a very large proportion is exported. It has been said that "New Zealand lives on grass," grass being the principal crop of the country from which is produced most of its wealth. A large percentage of the pasture growth is converted by the dairy cow into milk, the raw material on which the prosperity of New Zealand depends heavily.

COMMERCIAL buttermaking, therefore, is a very important pillar in New Zealand's economic structure, and of necessity it has been constructed on sound lines. When a commodity is mass produced, and particularly if it is perishable, uniformity of manufacturing technique is essential. Before 1939 a well-known member of the provision trade in Britain said he could easily believe that all New Zealand butter was made in one factory, so uniform was the quality and general make-up:

The buttermaking technique reviewed in this article is typical of that followed in most of New Zealand's butter factories, large and small. The

fundamental basis of the industry is quality, and for a long period of years no effort or expense has been spared to build up the good name enjoyed by New Zealand butter in Britain.

The first essential quality of New Zealand butter for export is that it shall keep, because the main market, Britain, is on the other side of the world. That quality demands extreme care in the production of milk on the farms and in the specialised work in the factories. So jealous of the quality of dairy manufactures was the industry that the rank and file, as well as the leaders, decided some 20 years ago to discipline themselves and pay differential prices in accordance with

quality for cream used for butter-making, though even before cream grading was made compulsory by Act of Parliament 70 per cent. of the butterfat made into butter in New Zealand was voluntarily graded by the dairy companies, the bulk of which were co-operative concerns.

Three grades and prices for cream provide a monetary inducement to the maintenance of a high standard. As cream quality has a distinct bearing on butter quality, and as butter is graded into five price categories, the financial success of a butter company is closely associated with the quality of the cream it receives. Cream and milk grading have given the industry a strong grip on quality and, if New Zealand is to continue to be known as the dairy farm of the British Empire, that grip must never be relaxed.

Cream Testing and Grading

On arrival at a butter factory cream or milk is weighed and a representative sample taken for testing for butterfat content at the end of the testing period; from milk an additional sample is taken for grading.

BUTTERMAKING IN NEW ZEALAND

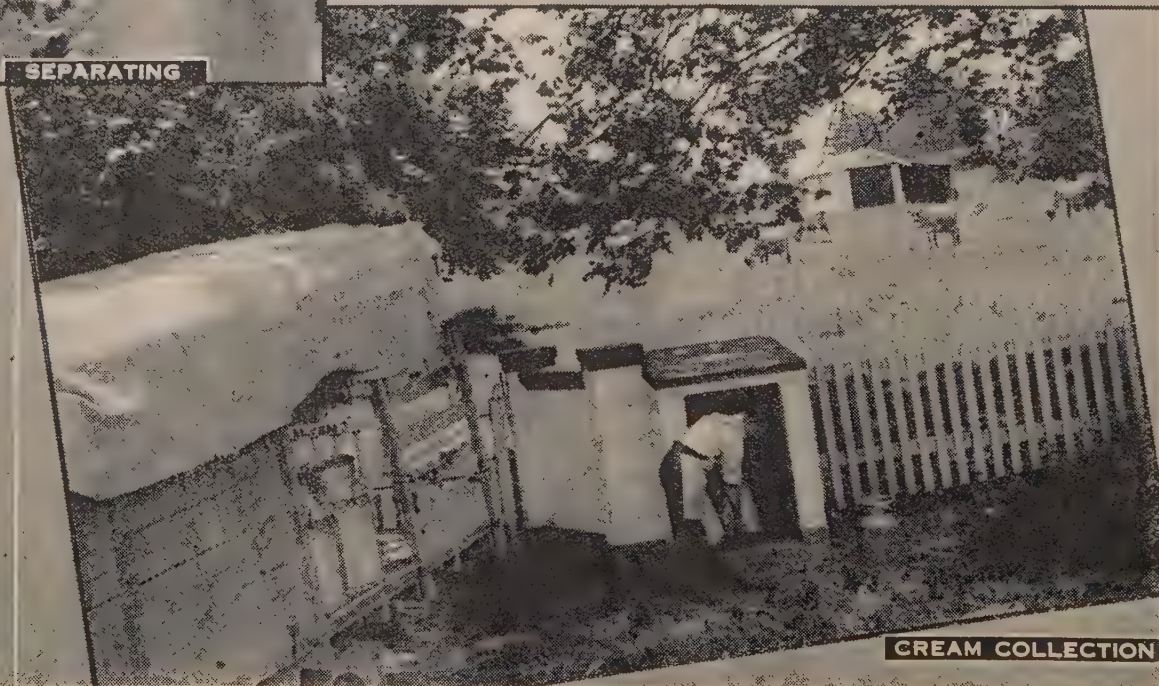


SEPARATING



THE MILKING SHED

Most of New Zealand's 1½ million cows in milk are milked by machine in over 31,000 plants. There were 1613 new milking sheds erected and 1772 substantially reconstructed in the two years ended March '31, 1946. To reduce the bulk of the product to be delivered to factories most of the cream is separated on farms. There are 47,783 separators in use on farms and the skim-milk, which is a valuable pig food, is usually pumped direct to the piggery. The cans of cream are placed in a small cool room at the farm gate, where they are collected by the factory truck, which makes many calls on its collection route. There are 49,000 suppliers to Dominion creameries.



CREAM COLLECTION

... BUTTERMAKING IN NEW ZEALAND

The Dairy Regulations provide that milk must be graded by a certified milk grader. Five methods are permissible by regulation for grading milk for buttermaking, but most butter companies employ the reductase-plus-senses method. The reductase test gives the indirect bacteria count; the senses method determines the flavour and body of the milk and their relation to the quality of the butter.

Cream is graded by a certified cream grader by sight, taste, and smell. In normal times the British housewife is the final grader, and she also grades on sight, taste, and smell. The skilled grader, when grading each can of cream separately, is determining whether that cream, if manufactured separately by the usual methods, would make up into "finest," "first-grade," or "second-grade" butter. The standard for butter grading in New Zealand is of necessity based on the opinion of the buyers in Britain, and the standards for milk and cream grading in New Zealand are based on the New Zealand standard for the grading of butter, so the grading standards are correlated. The regulations under the Dairy Industry Act provide that all milk and cream below second grade in quality shall be coloured violet and returned to the supplier, with no payment made for it.

A skilled cream grader of long experience can almost describe the conditions under which cows are grazed, the cleanliness or otherwise of the milking and separating operations, and the environment of the cream before delivery at the factory.

The weight and grade of the cream are recorded at the factory for payment, and a docket giving details of weight, grade, and test is sent to the supplier in the empty can. Before a factory manager or operative can grade cream or milk for payment he must pass the examination prescribed by the Dairy Division of the Department of Agriculture under the authority of the Dairy Industry Act. The Dairy Division is responsible for the control of milk and cream grading at all manufacturing dairies in the Dominion, and it is recognised that regular supervision is vital to any system of grading. As nearly as humanly possible, the standards for grading must be the same at all factories.

Most dairy factory suppliers are well aware that milk and cream grading are entirely impersonal, and often they are excellent judges of milk and cream quality. Many a supplier has been known to say: "I shan't get 'finest' today."

In many factories finest-grade cream is segregated from the first- and second-grade creams by pouring it into separate neutralising vats, and varied techniques are employed in the processing and preparing of creams for the churn. Cream adhering to the insides of cans after being poured is removed by a flusher containing steam or warm water. The empty cans are then washed; nearly all the larger factories are equipped with can-washing machines.

Neutralisation

When sufficient cream has been received to fill one or more neutralising vats, the process of neutralisation is begun.

The cream in the vat is well stirred and the degree of thickness noted. If necessary, it is diluted with good water and stirred again. The cream is then tested for acid content. Creams of various percentages of acidity, or degrees of "sourness," are received at all factories, and it is imperative that the acidity be controlled at this stage of manufacture. Much of the keeping quality of butter depends on the skill and accuracy of the operative controlling the neutralising phase. A butter that is too acid does not keep well, but cream which is over-neutralised imparts an alkaline flavour to the butter, and such butters are not acceptable in Britain. An alkali will neutralise an acid, and a mild neutralising agent such as bicarbonate of soda is usually employed.

It is believed that the technique of neutralising acid in cream for commercial buttermaking, involving the use of a carefully-prepared chart, was first evolved and practised in New Zealand. It is certain that the first neutralising chart was of New Zealand origin.

Acidity and Flavour

The "full" flavour of Danish butters is still heard of. Danish butter certainly did have a fuller flavour than New Zealand butter, but that type will not keep. A New Zealand factory could make a "Danish" butter at any time by adding to the cream a fairly large percentage of starter—a culture of acid-producing organisms. New Zealand has to be extremely careful with the use of starter for butter for export because it is not known when exported butters will be eaten. There was proof on many occasions before 1939 that some lines of New Zealand butter did not go into consumption until they were nine months old. It is therefore apparent that New Zealand must continue to make for export what is known as a "sweet cream" butter.

In addition, Britain must be given what she wants and pays for, and not what New Zealand thinks she should have. Emphasis has been placed on the control of acidity because of its influence on the marketing of New Zealand butter.

Pasteurisation

Immediately after neutralisation the cream passes to the pasteurising equipment. Pasteurising techniques vary from factory to factory and from district to district. The types of equipment can be summarised as follows:—

Flash system: It is usual to employ two simple Flash pasteurisers and work on the two-stage method. The cream is pumped or gravitated into the first pasteuriser and heated by a steam jacket and agitator to about 165 degrees F. The cream is then delivered into the hopper of the second pasteuriser, and at this stage certain vapours and gases escape at atmospheric pressure. The second pasteuriser raises the temperature of the cream to about 205 degrees F. The combined action of the neutraliser and the heat employed complete the neutralising phase, and at the same time a very large percentage of the bacteria is killed when the heat of the cream reaches the vicinity of 205 degrees F.

Vacuum pasteurisers: The use of this type of equipment involves the heating, purifying, and partial cooling of cream under a vacuum. Live steam is the heating agent, but, in contrast to the Flash type of pasteuriser, the steam is brought into direct contact with the cream. Some factories use one Flash pasteuriser in conjunction with a vacuum deodoriser unit.

Plate pasteurisers: Cream is pumped through narrow channels made by grooving a gang of plates erected on a stand. The ingoing cold cream is partially heated by the hot cream during its travel through the equipment. Cold cream entering a plate pasteuriser is partially heated regeneratively when passing through one set of plates. It is then brought to the desired high pasteurising temperature in the steam-heated section. The cream passes to the regeneration section, where it is partially cooled by the cold cream on the reverse sides of the plates. It next travels the water-cooled plates and finally through the low-temperature, chilled-brine section, and leaves the unit in the vicinity of 50 degrees F. In some factories the plate pasteurising equipment has been used as a cooler only and the steam section omitted. Cream passing through a plate pasteuriser is both heated and cooled at higher than atmospheric pressure.

BUTTERMAKING IN NEW ZEALAND

Every delivery of cream at the factory is sampled for grading and butterfat testing and a composite test is made every 10 days, each supplier having a numbered sample bottle, which is kept in a revolving rack for ease of handling. The dairy company cream grader certified by the Government places a docket showing the weight of the cream and the grading in the sterilised can so that the information is quickly available to the farmer when his empty can is returned by the collecting truck.

SAMPLING CREAM FOR BUTTERFAT TESTING

CREAM DOCKET IN STERILISED CAN

... BUTTERMAKING IN NEW ZEALAND

No type of cream pasteuriser is a cure-all for the ills that beset cream used for buttermaking. Though opinions differ about the expelling of feed flavours and unclean flavours, the main object of pasteurisation should be to kill a very high percentage of the bacteria in the cream, leaving few to cause rapid deterioration of the butter in cold storage. During any cream-pasteurising process some flavours and gases are removed from the cream, but not only the undesirable elements are expelled.

The New Zealand butter industry should aim at producing high-quality, untainted, sweet cream, at getting the cream as quickly as possible to the factories, and submitting it to the minimum treatment necessary to ensure that a high-quality, good-keeping product with true butter "character" is manufactured. In fine, New Zealand's aim should always be to prevent contamination of cream rather than to spend large sums of money removing that which is undesirable. Butter is only as good as the cream from which it is made.

Cooling of Cream

A fairly wide variety of methods is employed in the Dominion to cool cream after pasteurisation. When cream leaves an efficient pasteurising unit it is practically germ free, and it is essential that that condition remain until the churning process is completed on the following day. It is therefore necessary to cool it rapidly to a temperature considered safe and low enough to slow up the breeding of bacteria remaining unkilld after pasteurisation.

A method in common use is to pass the hot, pasteurised cream over one or more external water coolers. Water cooling is cheap, and the management of an efficient butter factory will see that the area of the cooling surfaces is sufficient to reduce the cream to within 4 to 6 degrees of the temperature of the water available. That is sound economics, as the cream is subsequently cooled by mechanical refrigeration, which is expensive.

After leaving the water coolers the cream is pumped to one or more direct-expansion coolers or frost coolers. In structure the direct-expansion cooler resembles a water cooler, but, instead of water, liquid ammonia is released from high pressure into the tubes of the cooler. When pure liquid ammonia is released from a high pressure, say 150lb. to the square inch, to a pressure of about 25lb. to the square inch, its boiling point is in the vicinity of 50 degrees below freezing point. When the released ammonia boils inside the tubes of the direct-expansion cooler it takes heat out of the tubes and

the cream running over the tubes. So rapidly is heat extracted that frost quickly forms on the cooler tubes and cream can be seen running over the frost. An efficient operator of a direct-expansion cooler will allow frost to form on the cooler only at the same rate as he can dissipate it with the cream running over the cooler. Too much frost and ice on the cooler tubes cause a certain amount of insulation, which is a deterrent to the exchange of heat between the cream and the ammonia.

During the greater part of the season it is usual to reduce the temperature of the cream with this cooler to about 50 degrees F. Cream received during the late autumn and winter is not subjected to this "shock" cooling. A series of tests for the acid content of the pasteurised and cooled cream is taken at this stage.

Some factories use water coolers and direct-expansion coolers of the enclosed internal type. With those coolers the cream is pumped through the inside of the tubes, which are surrounded by water or ammonia. There is a diversity of opinion about the advantages of external and internal coolers: Some claim that cream should not be exposed to bacteria in the atmosphere when running over external coolers; others aver that vapours and gases should escape freely when the hot cream is running over an external cooler, and also that the aeration is beneficial to the flavour of the butter. Hundreds of thousands of tons of cream in New Zealand factories have been cooled over external coolers and the standard and keeping quality of the resultant butter have given satisfaction in Britain. A few factories still employ chilled brine or chilled water as a cooling agent, pumping it through the final tubular cooler.

Stainless steel has been used fairly extensively for receiving vats and all types of pasteurisers and coolers. It has the disadvantage of not being quite as good a conductor of heat and cold as other metals used in pasteurisers and coolers, but it is generally agreed that that disadvantage is well outweighed by the advantages. Much more stainless steel equipment would have been installed if the war had not intervened.

Holding Vats

After leaving the final cooler the cream is pumped to the holding vats, which are nearly always of the direct-expansion type and vary in capacity from 500 to 3000 gallons or more. A few oblong vats still remain, but the majority today are circular. The cream pan or lining is made of stain-

less steel, tinned copper, tinned steel, or enamelled steel; stainless steel is most used.

The cream pan of the direct-expansion vat is surrounded by a jacket in which either water or an anti-freezing mixture is used. In the jacket is a coil of ammonia piping which operates in the same fashion as for the chilling of a direct-expansion cooler. Nearly all direct-expansion vats are equipped with mechanical stirrers or agitators, but in small vats hand-propelled stirrers are used.

It is usual to begin freezing on the direct-expansion vats before the pasteurising work of the day is started, and the temperature of the water jackets is reduced to 30 to 40 degrees F. When the chilled cream from the final cooler begins to flow into the direct-expansion vats the stirrers are set in motion and the freezing on the vats continued. When a vat is full of cream the vermin-excluder covers are placed in position. Taking into consideration the season of the year and the weather prevailing, the factory manager determines the temperature at which he desires the cream to be churned the following morning. After checking the temperature of the cream in the vat and the temperature of the jacket water, a decision is made whether further freezing is necessary. At that juncture the first stage of the two-day manufacturing period is completed.

This first stage can be called "the preparation of the cream for the churn." It is by far the most important stage and has a direct bearing on the quality of the butter to be churned next day. It also has a bearing on the percentage of mechanical loss which must occur when the cream is churned. The cooling and refrigeration work performed during this stage largely determine whether the churning temperature of the cream and the temperature of the chilled water used for washing the butter are suitable on the following morning.

Churning

The buttermaker's first duty on the morning of churning is to stir all the vats of cream thoroughly. The temperature of the cream in each vat and of the chilled water used for washing the butter are recorded. The cream in each vat is tested for acid content and recorded. These operations constitute a check on the work of the previous day. The churns are then filled with cream to the correct level and set in motion.

The butter churn dates back to antiquity. Many centuries ago a desert nomad carrying milk in a goatskin

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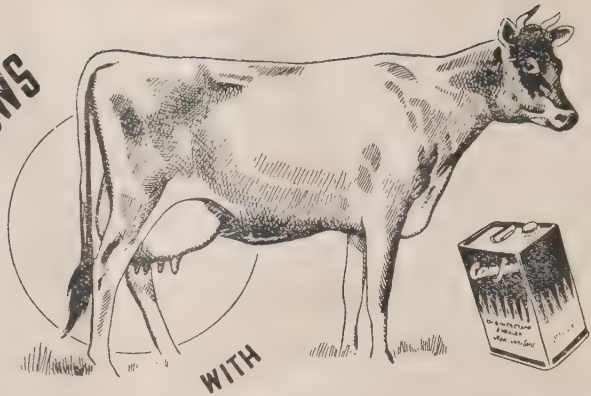
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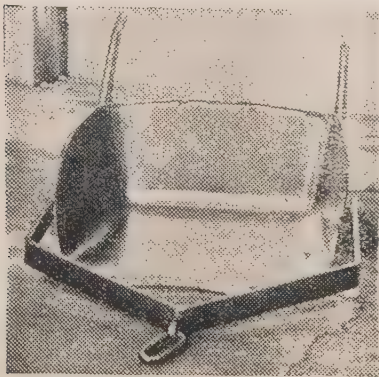
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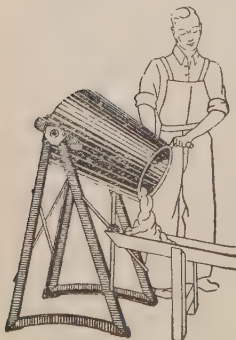
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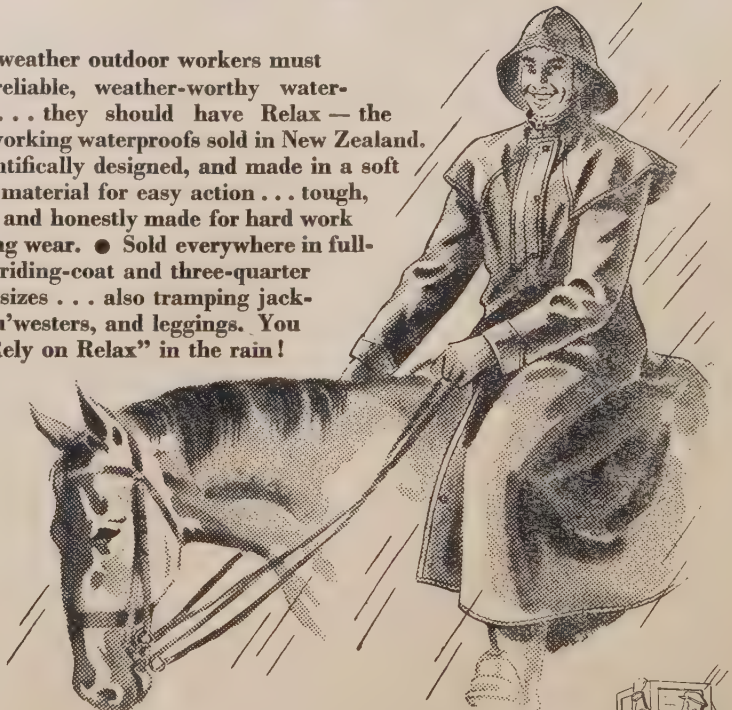
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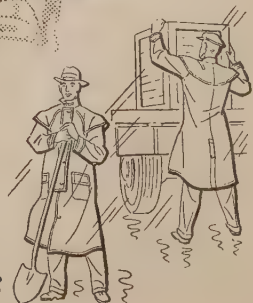
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W/VV4

bag on his camel discovered at the end of his journey that portions of the milk had been turned into granular butter. That was the dawn of dairy development. Later a crude churn was constructed from a hollow log with sealed ends which was suspended by ropes from a tree, partially filled with milk or hand-skimmed cream, and agitated. From the log churn was evolved the barrel churn, the box churn with its circular, travelling, butter-working table, the present-day external worker churns, and the most modern and most used internal worker churns with capacities of 30 to 100 boxes of butter. The 100-box churn is used in many factories and its output averages about 2½ tons of butter a churning.

Kauri has been used extensively for making the barrels of New Zealand churns and was fairly satisfactory when "selected" kauri was available. Teak from Burma and India has proved much more satisfactory, but the war and other circumstances stopped the importation of teak. It is hoped that the day is not far distant when teak will again be used in the construction of churn barrels and worker rollers.

In many factories each churn is driven by an electric motor through a V-belt drive.

After a filled churn has been revolving in top gear for 30 to 40 minutes the cream begins to "break" in the churn; that can be seen through a small glass sight-door on the front of the churn. A technical explanation of why cream turns into butter in the churning process is beyond the scope of this article; suffice it to say that the globules of butterfat are caused to cluster by the concussion brought about in the revolving churn.

The body, texture, and in part the keeping quality of the butter are largely affected by the buttermaker's judgment at this juncture. The churn is kept revolving until the butter granules are about the size of peas but not larger than maize. The churn is then stopped and the buttermilk run off through large valves in the churn barrel. It is pumped to large tanks and usually sold on contract to a local pig farmer. A few butter companies have found it necessary to establish their own pig farms to dispose of the buttermilk economically, and more recently there has been some development in the drying of the buttermilk, which results in a valuable food product.

In well-managed factories samples of the buttermilk are tested periodically for butterfat content. Losses of butterfat in buttermilk are unavoidable, but they can be minimised by good management. In round figures, of every 100lb. of butterfat received by a butter factory 1lb. is lost in the buttermilk. A well-managed factory

using simple Flash system pasteurisers and avoiding undue friction to the cream at all stages can keep this loss below 1 per cent., but where certain types of pasteurisers are used and undue friction to cream is not avoided the loss can be as high as 2 per cent. A difference of 1 per cent. in the churning loss may not appear great, but it could cost a butter factory with an annual output of 1000 tons £2200 a year.

Salting and Working

When the buttermilk has been run off, chilled water of a suitable temperature is run into the churn, the churn revolved, the butter washed, and the bulk of the wash water run off. Finely-sifted, high-quality salt is then well distributed over the mass of the butter granules; the amount is usually sufficient to ensure from 1.4 to 1.8 per cent. of salt in the finished butter. The large front door of the churn is then closed and the churn revolved a few times in low gear with the worker rollers idle to enable the salt to be dissolved before the process of working in the salt and water is begun. The fluted worker rollers are then set in motion, and the churn proceeds in low gear with the working process.

During the ensuing 20 minutes the buttermaker's skill and judgment will largely determine the body and texture of the butter, its keeping quality, and the profit his factory will make from that churning.

The working process continues for the time determined by the buttermaker, and the granular butter is worked up into large rolls by the action of the slowly-revolving churn and the fluted worker rollers inside it. At a certain stage the churn is stopped and a sample of the partially-worked butter taken to be tested for water content. The test is simple. Ten grammes of butter are weighed in a beaker on a very sensitive scale. The beaker is placed over a flame, and the water boiled out of the butter. The butter in the beaker is reweighed, and the difference between the first and second weighings is the water content of the butter. An accurate determination is obtained when the butter and the beaker are weighed cold.

The food laws of most countries prohibit the sale of butter containing more than 16 per cent. of water, so the buttermaker has to ensure that the product does not exceed that figure. The first test for water content may disclose that the unfinished butter contains a good deal less than 16 per cent. The physical condition of the butter is noted and the buttermaker

satisfies himself that further working will not injure its body, texture, and keeping quality. If he is satisfied, the working process is continued and he may find it necessary to add more chilled water to the churn for incorporation into the butter. Most companies endeavour to achieve an average water content in the butter of from 15.6 to 15.8 per cent., but when it is patent that the continuation of the working process for the sake of incorporating additional water will be detrimental to the butter, the process should not be continued.

An overworked butter becomes "greasy" and "salvy" and does not keep well. "Salviness" can affect both the body and the flavour of butter, can cause it to be graded down, and cannot be counted on to give full satisfaction to the buyer. An efficient manager ensures that the butterfat churned in his factory every day is in the condition to stand up to the amount of working demanded by the incorporation of 15.8 per cent. of water.

Butter must also be salted with care if "streaky" or "wavy" colour is to be avoided. The amount of salt is very important. It is added to butter for two main reasons: To make an insipid article—unsalted butter—palatable, and to assist the keeping quality. The skilled buttermaker endeavours to balance the flavour of the butter with salt. If butter is undersalted, the flavour is underbalanced; if butter is oversalted the flavour is overbalanced.

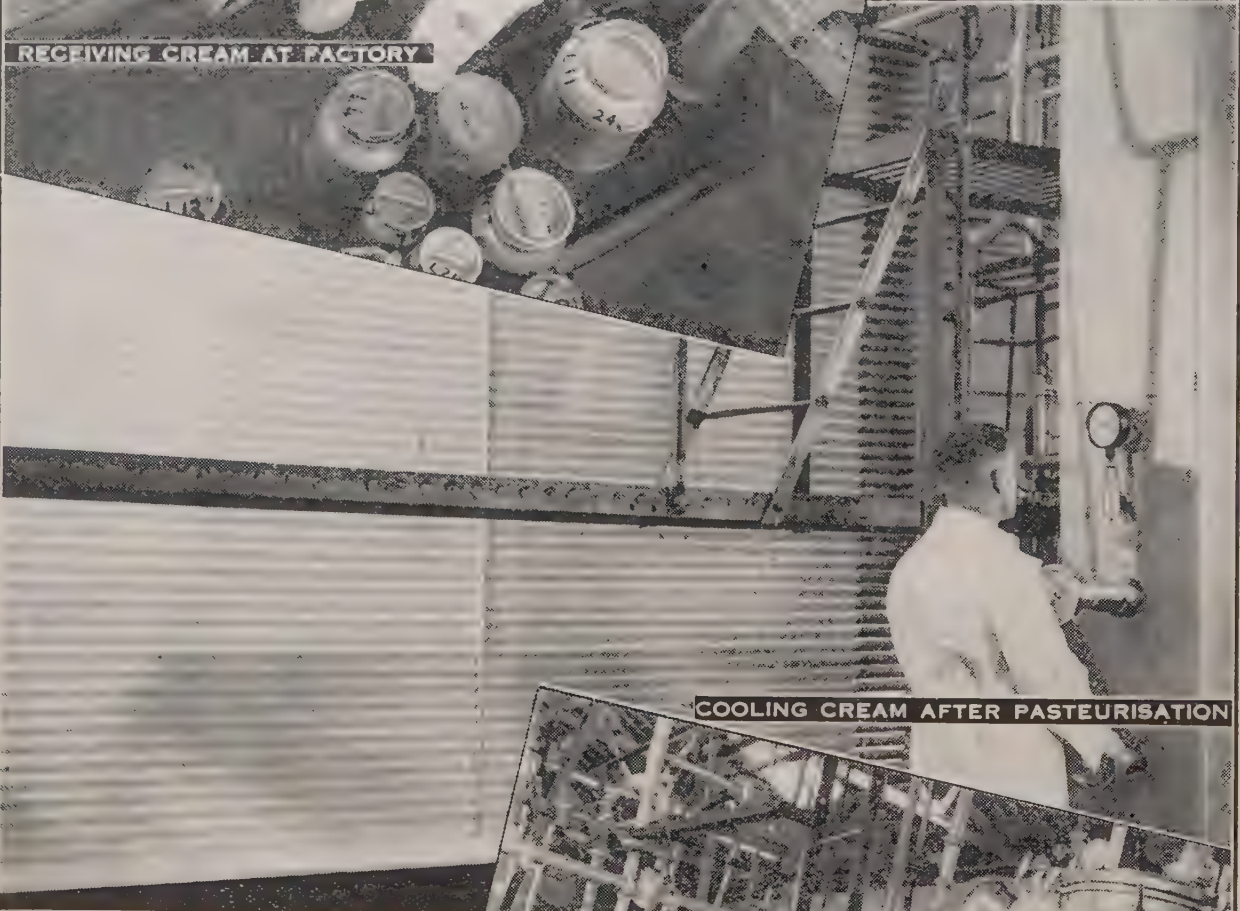
The legal limit for New Zealand butter for export is 2 per cent. of salt, but very few New Zealand butters will carry 2 per cent. of salt without the flavour being made coarse or harsh. Butter made from stale, "feedy," sour, and unclean creams will not carry the same percentage of salt as will butters made from sweet, nutty-flavoured creams. Judgment enters largely into the salting of butter. The incorporation of ¼ per cent. more salt than a butter can carry almost invariably causes the grade to be lowered. The average salt content of New Zealand butters exported is about 1.7 per cent.

With water and salt incorporated to his satisfaction, the buttermaker concentrates on the final finishing of the working process. He takes a piece of the butter, breaks it in two, and looks carefully into the break. Well-made butter when broken should have a grain like that of good-quality cast iron. If free moisture is apparent, the butter is worked a little more until it is absorbed. Though butter may contain nearly 16 per cent. of water, the water must not be visible. At the finishing stage a strict watch is kept for any sign of overworking.

BUTTERMAKING IN NEW ZEALAND

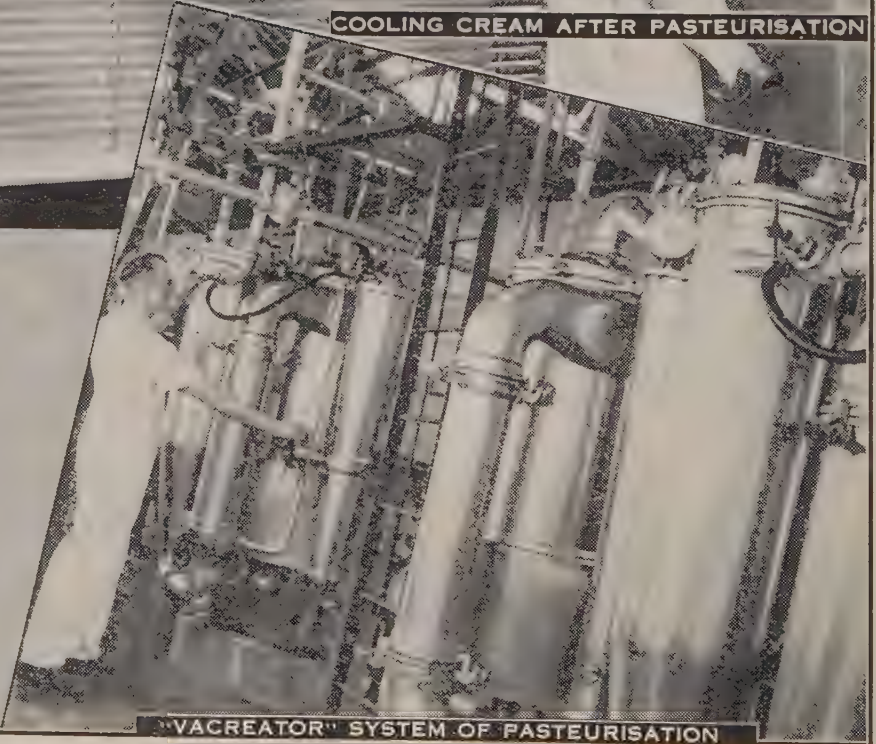


RECEIVING CREAM AT FACTORY



COOLING CREAM AFTER PASTEURISATION

Cans are weighed at the factory and the cream tipped into receiving vats; numbers and letters on cans signify collection routes and suppliers' factory numbers. The "Vacreator" system of cream pasteurisation was evolved in New Zealand to treat cream under a special vacuum process. After pasteurisation the cream is cooled in two stages to reduce it to churning temperature.



"VACREATOR" SYSTEM OF PASTEURISATION

When finished the body, texture, colour, waxiness, and sheen of the butter should be "just right." That is a buttermaker's description, and no other is adequate.

Packing

When churning is completed the unloading trolley is run inside the churn and the butter unloaded on to large butter tables. Samples are taken for final checks on the water and salt contents, and then packing operations are begun.

Ramming butter by hand into boxes for export is mostly confined to small factories making whey butter. A few factories making creamery butter use the mechanical ram packing machine, but the majority employ the 56lb. butter moulder. Butter from the churn is placed loosely in a large hopper at one end of the machine. A revolving, stainless steel worm pushes the butter through the moulder and extrudes it in a continuous rectangular piece along a wooden roller conveyor. The operator stops the machine and brings down the wire cutters, cutting the moulded butter to the correct length and almost to the correct weight. The moulded block then travels to the scale section, where the weight is adjusted to 56lb. 2oz.

Further along the conveyor each block is wrapped by hand with pure, white, vegetable parchment paper. It is then placed in a wooden butter box or fibre container and the package sealed and finished off. The churning number and the date of churning are stamped on each container, which also bears the national "Fern Leaf" brand and the brand and registered number of the factory.

Before being sent to the nearest grading store for grading and freezing the packages of butter are stored in a cool chamber adjoining the churn room. Factory cool chambers are usually held at a temperature of 30 to 40 degrees F.—sufficiently cool to set up the butter in readiness for transport to the port of grading. Butter held in a grading store before shipment overseas is usually maintained at a temperature of 10 to 12 degrees F.

Factories also have butter for the local trade to manufacture. Most of this is made up into 1lb. pats at the factory, and the wrapper usually bears the brand of the factory or company. In some instances ½lb. pats are also made. Before butter rationing New Zealand consumed about 30,000 tons of butter annually, but rationing has reduced that considerably.

Composition of Butter

The constituents of New Zealand's export butters are very uniform and the following figures are typical: On

... BUTTERMILKING IN NEW ZEALAND

the average, every 100lb. contains 82lb. of butterfat, 15.7lb. of water, 1.65lb. of salt, and .65lb. of curd and ash. That is termed the short analysis. The main constituent is butterfat and for that only is the supplier paid. Thus, the factory supplier is paid for about 82 per cent. of the constituents, and the factory has the opportunity to add another 18 per cent., which costs it very little. If a factory has 83 per cent. of butterfat in the butter, only 17 per cent. of other constituents has been incorporated and a heavy loss to the company is the result. Some butter factories with very efficient management have averaged as low as 81.65lb. of butterfat in every 100lb. of butter and have therefore been able to incorporate 18.35lb. of water, salt, curd, and ash.

But no factory should wilfully sacrifice the quality of its butter in endeavouring to achieve a very low butterfat content. The incorporation of about 18lb. of water, salt, curd, and ash with 82lb. of butterfat is quite legal and honest, and the profit made from this ordinary commercial procedure is sufficient to pay all of the company's costs from farm gate to f.o.b. and still leave a substantial balance to be distributed among the suppliers.

Yield and Overrun

To many butter factory suppliers "overrun" is a somewhat mysterious factor connected with the operation of their butter factory. In fact, the overrun is the 18lb. of water, salt, curd, and ash added to the butterfat. Those constituents would give an overrun of nearly 22 per cent. if there were no mechanical losses in butter-making. But it is impossible to make and market butter without losing butterfat in the buttermilk and without giving away 2oz. of butter to each 56lb. box as "trade allowance." Other unavoidable losses when butter is manufactured cause the overrun to be lower.

A factory overrun can be defined as "the difference between the butterfat that is paid for and the butter that is paid for." In comparing annual payments made by butter companies many factors have to be taken into account, among them locality, cost of cream collection and other haulage, management, and the quality and composition of the butter. If those items are comparable, the determining factor of the pay-out will be the overrun of each company. No company can do more than pay for all the butterfat it receives, and, though the pay-out might appear to be lower, in fact that might not be so.

Sanitation

The success of nearly every phase of buttermaking depends on the sanitary conditions of the land, buildings, and equipment of the butter factory. Cleanliness is the foundation of dairying, and that applies from the cows' teats through all the processes to the port of grading.

Before a factory can begin operations as a manufacturing dairy it must be licensed, and before that licence is issued by the Department of Agriculture certain necessary standards must be complied with: Good water supply and drainage, readily-cleanable machinery and equipment, and in a butter factory ample machinery and equipment to control temperatures. New Zealand takes its butter industry very seriously and the days of "near enough" are gone.

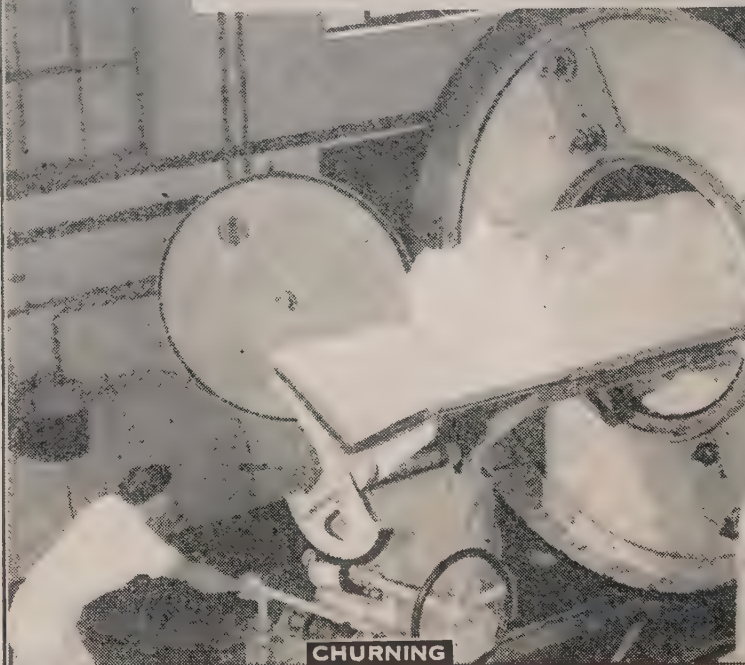
Rigid discipline in the sanitary condition of the buildings and equipment is the rule in most butter factories. That is as it should be, as, apart from all other considerations, a butter factory should set an example to its suppliers. Every factory has a definite programme for the daily cleaning of the factory and equipment. Each member of the staff has his responsibilities and all members, including the manager, and also the visiting Dairy Instructor, have been reared on "washing-up."

Recontamination of cream or butter after pasteurisation is considered a sin in most butter factories. If the sanitary condition of any part of the equipment is neglected, the result of the laxity is apparent when the results of the bacteriological tests are received. Periodically samples of all brands of butter for export are forwarded to the Dairy Division laboratories for bacteriological examination, as well as for detection of yeasts and moulds. The results of those examinations are sent to the Butter Instructor for the district, who supplies the details of the bacteria counts to the factory managers and after investigation advises on measures to reduce the counts if reduction is necessary. Many factories consistently gain "good" and "very good" reports, and "excellent" reports are by no means rare.

It is generally agreed that, qualities of flavour, body, and texture, packing, and finish of export butters being equal, the butter with the lowest bacteria count can be expected to stand up best to storage and give most satisfaction to the consumer.

Boiling water and live steam are used in large quantities for cleaning in butter factories. Such heat is capable of destroying most types of bacteria that are harmful to butter. Some factories use small amounts of

BUTTERMAKING IN NEW ZEALAND

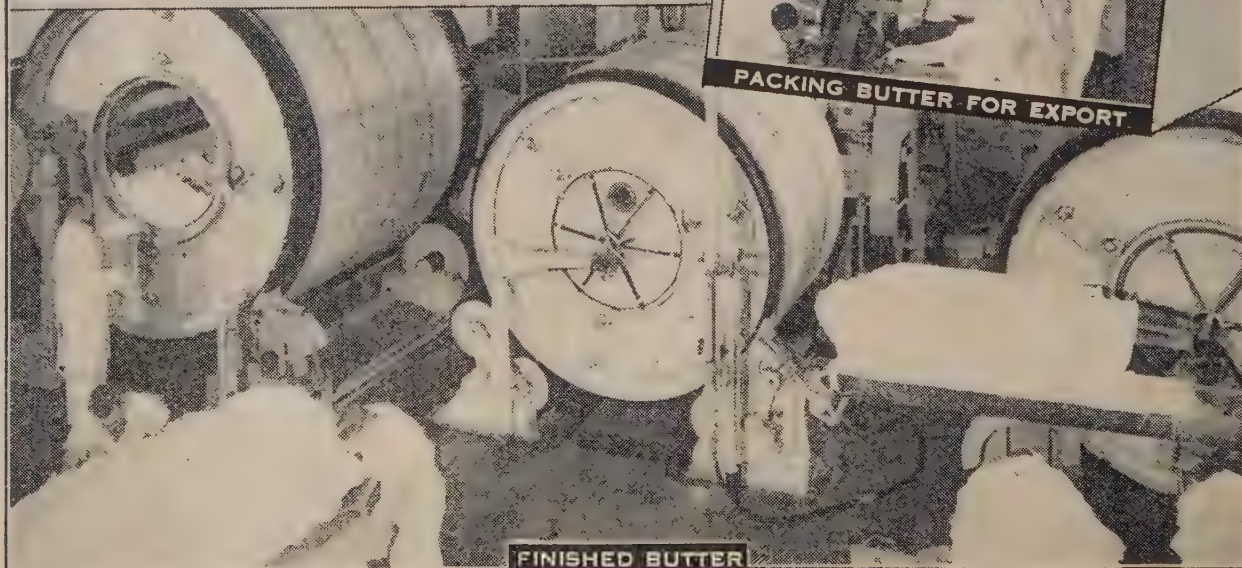


CHURNING

Finished butter is removed from the giant churns by trolleys, each trolley holding 1 ton. Churns illustrated are of $2\frac{1}{2}$ tons (100 box) and $1\frac{1}{2}$ tons (65 box) capacity. Butter is placed in bulk in the packer and extruded in 56lb. blocks. It is then check weighed and packed for export. There are 157 butter factories or creameries in New Zealand with an output in 1944-45 of 151,000 tons, of which about 125,000 tons was exported.



PACKING BUTTER FOR EXPORT



FINISHED BUTTER

chemical sterilisers, but generally they are not favoured. Butterfat and butter have a penchant for absorbing odours, and much care has to be used if odorous chemical sterilising agents are employed. Soda, soda ash, and various alkaline mixtures are used to soften the water used for cleaning.

Refrigeration

In the early days of New Zealand's commercial butter manufacture the factories were not equipped with mechanical refrigeration. A few factories were able to buy ice to assist in reducing the temperature of the cream for churning. About 1889 the first refrigerating machine was installed in a New Zealand butter factory, and from then real evolution in butter manufacture was begun in this Dominion. Ammonia is the freezing agent used in most refrigerating plants in butter factories today, but some years ago a few CO₂ machines were in operation.

Without mechanical refrigeration New Zealand's main exports would be wool and tallow. Refrigeration has certainly been the main factor in making the butter industry possible.

Directors, Executives, and Staffs

Nearly all directors of New Zealand dairy companies are dairy farmers who have made a success of their own farming and are public spirited enough to serve their fellow-suppliers in the direction of the local company. The board elects the chairman, and this team of elected men directs the affairs of the company with the assistance of the chief executive officers—the factory manager and the secretary. Much credit is due to the tenacity, perseverance, and judgment of the directors of the pioneering dairy companies. They built a solid foundation and as a result of their energies and foresight a mighty industry has arisen.

The industry has been well served on the accountancy side. Dairy accountancy has problems peculiar to the industry, and many brilliant men have been and are secretaries of dairy companies.

From the early stages the New Zealand butter industry has been fortunate in its factory managers. Their ingenuity and skill have contributed very largely to the methods of manufacture which are peculiar to and part of our New Zealand system. All butter factory managers have risen from the ranks and nearly all have been through that grinding mill of seven days a week on duty for eight months out of the twelve. Unlike the managers of many other concerns, they are responsible for the handling of a perishable product that pours in on them every day of the week. If troubles occur, they cannot pause;

they must improvise and carry on or they will be swamped on the following day. The New Zealand butter factory manager cannot say all is well with his product until it is eaten, and that might be nine or more months after the butter is made. An adverse report on butter opened up in Britain can have some repercussion on the factory manager. All dairy factory managers carry out their duties under licence from the New Zealand Dairy Factory Managers Registration Board. Licences are issued only to well-trained, practical, qualified men.

Many factory managers were on dairy farms before beginning at the bottom of the ladder in their first dairy factory. That experience has tended to make them more sympathetic in their dealings with their company's suppliers. Most factory managers have developed tact to a marked degree, but without fear or favour they are the friends of the factory suppliers.

For many years the manufacturing side of the New Zealand butter industry has afforded great possibilities to keen young men who are prepared to learn buttermaking. The work calls for brawn as well as brain, and those who wish to go through to the higher positions must be prepared to study. The industry has many clever young men on factory staffs, and many of them are the holders of engine drivers' certificates, as well as cream and milk graders' certificates. A fair number hold Massey College diplomas, and

most of the first assistants have a factory manager's licence.

Dairy instruction under the direction of the Department of Agriculture was begun in 1892, and since then Butter Instructors and Cheese Instructors have been closely associated with all New Zealand factories.

Dairy Instructors work in co-operation with all engaged in the manufacture of dairy produce; all today's instructors have been dairy factory managers and most of them had practical dairy farm experience at the outset. It is the duty of Dairy Instructors to give practical instruction in factories on all phases of commercial buttermaking or cheesemaking. A Dairy Instructor keeps in touch with the grade notes at the port of grading, thus ascertaining the quality of the produce sent forward for export from each factory in his district. That enables him to concentrate on the factories whose produce is lower in quality than it should be.

Other duties include the inspection of buildings and plant, and advice on the construction of and alterations to butter and cheese factories. The supervision of Farm Dairy Instructors and of all cream and milk grading in his district are also the responsibility of the Dairy Instructor.

For more than 50 years the aim of the Dairy Instructors has been to assist all engaged on the manufacturing side of New Zealand's dairy industry, and they have received steady co-operation in that work.

... BUTTERMAKING IN NEW ZEALAND

Computation of Wages Tax

IN accordance with the National Security Tax Abolition Emergency Regulations, 1947, national security tax will not be payable on any salaries and wages after April 20, 1947. The only wages tax payable on salaries and wages will be social security charge levied at 1d. in every 1s. 1½d. or part thereof of such salary or wages. This is equivalent to a rate of 1s. 6d. in the £.

The social security charge also applies to

any other income from which tax is deductible at the source in the same manner as salaries and wages.

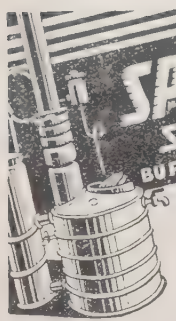
The tables below will assist in computing the tax on any amount up to £18. For example, to find the tax on wages of £9 7s. 6d., take the tax on £9 from the first table (13s. 6d.) and add the tax on 7s. 6d. from the second table (7d.). The total tax payable is then 14s. 1d.

TABLE I

COMPLETE POUNDS				COMPLETE POUNDS			
Amount of Income	Charge Payable	Amount of Income	Charge Payable	Amount of Income	Charge Payable	Amount of Income	Charge Payable
£	£ s. d.	£	£ s. d.	£	£ s. d.	£	£ s. d.
1 ..	1 6	5 ..	7 6	9 ..	13 6	14 ..	1 1 0
2 ..	3 0	6 ..	9 0	10 ..	15 0	15 ..	1 2 6
3 ..	4 6	7 ..	10 6	11 ..	16 6	16 ..	1 4 0
4 ..	6 0	8 ..	12 0	12 ..	18 0	17 ..	1 5 6
				13 ..	19 6	18 ..	1 7 0

TABLE II

SHILLINGS AND PENCE				SHILLINGS AND PENCE			
Amount of Income	Charge Payable	Amount of Income	Charge Payable	Amount of Income	Charge Payable	Amount of Income	Charge Payable
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
From 1 1 to 1 1	..	From 10 1 to 11 1	..	From 10 1 to 11 1	..	From 10 1 to 11 1	..
From 1 2 to 2 2	..	From 11 2 to 12 2	..	From 11 2 to 12 2	..	From 11 2 to 12 2	..
From 2 3 to 3 4	..	From 12 3 to 13 4	..	From 12 3 to 13 4	..	From 12 3 to 13 4	..
From 3 5 to 4 5	..	From 13 5 to 14 5	..	From 13 5 to 14 5	..	From 13 5 to 14 5	..
From 4 6 to 5 6	..	From 14 6 to 15 6	..	From 14 6 to 15 6	..	From 14 6 to 15 6	..
From 5 7 to 6 8	..	From 15 7 to 16 8	..	From 15 7 to 16 8	..	From 15 7 to 16 8	..
From 6 9 to 7 9	..	From 16 9 to 17 9	..	From 16 9 to 17 9	..	From 16 9 to 17 9	..
From 7 10 to 8 10	..	From 17 10 to 18 10	..	From 17 10 to 18 10	..	From 17 10 to 18 10	..
From 8 11 to 10 0	..	From 18 11 to 20 0	..	From 18 11 to 20 0	..	From 18 11 to 20 0	..



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Jennie				
Peggy				
Alice				
Creamy				
Pansy				
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Japanese Farming: "Maximum Land Utilisation"

IF Japanese agriculture had to be described in a single phrase, perhaps "maximum land utilisation" would be the most fitting description of a system of farming completely alien to New Zealand eyes, writes Lieutenant A. V. Allo, formerly Instructor in Agriculture, Tauranga, and at present with the occupation forces in Japan.

JAPAN'S topography is very similar to much of New Zealand's North Island hill country. There are four main islands: Hokkaido in the north, Honshu, the principal island of Japan, Kyushu in the south, and Shikoku on the eastern side of the Inland Sea. The general land surface of all four consists of a thick core of moderately-rugged hill country and high mountains, containing many intermontane basins, with a narrow discontinuous perimeter of terraces and delta fans. Of the relatively few large areas of plains land the largest is the Kanto Plain, of about 3,500,000 acres, near Tokio. Most of the coastal plains are very narrow, rarely extending inland more than 20 miles. Almost four-fifths of the area of Japan proper is hilly to mountainous, with many volcanic cones. There are many streams and rivers, all of them short, swift, and shallow.

The climate of Japan varies greatly, as may be expected in a land with a latitudinal spread of 15 degrees—from 30 degrees north to 45 degrees 30 minutes north. The climate of the northernmost island of Hokkaido is marked by a short growing season and long, cold winters, the country being under snow from November until April. Further south, down Honshu to Kyushu, the winters become milder and the summers longer, hotter, and more oppressive. The rainfall varies considerably, but in general is greater than that over most of New Zealand, the average precipitation being between 60 and 70in.

The total land area is 147,000 square miles, of which 60 to 65 per cent. is in forest or bush and unsuitable for farming, and only 15 per cent., or 15,000,000 acres, is available for agriculture.

Types of Soil

Most Japanese soils are volcanic in origin, with extensive ash deposits in Hokkaido, the Kanto Plain, and southern Kyushu. The soils of Hokkaido are mainly podzols, with the profile characterised by a thick humus layer overlying a nearly-white mineral layer



on top of a brownish, clayey subsoil. The soils of central and northern Honshu are mainly grey-brown podzols and brown forest soils, with a moderately thick humus layer, brownish-grey surface soil, and yellow-brown to brown clay subsoil. The soils of Kyushu, Shikoku, and southern Honshu are mainly red and yellow podzols with only a thin humus layer overlying a light grey to yellowish strata on top of a reddish or yellow subsoil. Most of the upland soils are thin and stony, with a weakly-developed profile. "Paddy" soils, developed on level terraces, delta fans, and flood plains, have well-defined profiles, with a granular grey to dark grey surface layer underlain by a grey to brownish-grey compact clayey subsoil.

All Japanese soils are low in natural fertility, centuries of cultivation having removed most of the available plant food elements.

Of a total population of more than 70,000,000 people, more than two-fifths depend directly on the land for a living, so with only 15,000,000 acres available for agriculture Japan is of necessity a nation of peasant farmers. Imports of foodstuffs are very low, and home agriculture has provided about four-fifths of the country's food requirements for the past 20 years. Every available inch of land is used to the utmost for food production. Fences are unknown and crops are grown right to the edges of the narrow roads. All land around houses is planted in vegetables.

The average size of Japanese farms is only about 2½ acres, though more than 67 per cent. of the holdings are smaller than that. Farming is made even more difficult by the fact that a farmer's holding may not be in one block; he may be farming four or five small pieces of land several miles

apart, varying from a tenth to half an acre and totalling less than 2 acres. That of course leads to inefficiency of operation and waste of time in travelling from one patch to another. An attempt is now being made to consolidate farm holdings so that each farmer will have his land in one block.

Impoverished Tenant Farmers

A feature of Japanese farming is that much of the land is owned in large areas by wealthy land owners, who rent it out to the peasant farmers. It is estimated that more than half of the irrigated rice land and 37 per cent. of the non-irrigated uplands are farmed by tenant farmers.

The system of rental payments in Japan would be possible only in a country where feudalism still exists and the vast majority of the population is completely under the dominance of a wealthy minority. The owner of the land takes half the crop, out of which his only liability is the payment of land tax. The tenant takes the other half, and is responsible for all the costs of production of the crop.

The tenant farmer is thus weighed down with an increasing burden of debt. It has been estimated that in only four years out of ten does the farmer obtain a yield sufficient to cover his costs and leave any margin of profit. Farm wages are low.

During the past few months efforts have been made to put Japanese agriculture on a sounder financial footing, and legislation has been passed to take land away from the large landholders and give tenants the freehold of the land they are farming. That should have a profound effect on the economic life of Japan and give farming a basis of stability and a hope of prosperity that it has never had before.

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FARMING IN JAPAN . . .

Japanese agriculture should be described as gardening rather than farming. Most of the work is done by hand, and the complete lack of mechanisation in the area of southern Honshu where the New Zealand troops are stationed is one of the most striking features of the countryside. Further north there is some mechanisation in areas where dry-land farming rather than paddy farming is practised, but the degree of mechanisation throughout the country is very small.

Production per unit of area is high, especially considering that fertilisers are extremely scarce and the land has been cropped for centuries, but production per unit of labour is very low.

Double Cropping

A feature of farming in southern Japan is the system of double cropping. The paddy fields are drained before the harvesting of the rice crop in October and early November and ploughed as soon as the rice is harvested. The land is then worked up into beds about 4ft. wide and 6 to 8in. high, in which wheat, oats, or barley is sown in bands. That crop is harvested in late May and early June, and the ground is immediately ploughed, flooded, ploughed again, and planted in rice. The rice seedlings, grown in a separate nursery, are about 10in. high at the time of planting.

By adopting this system of double cropping the Japanese have been able to increase the area in crop by about a third. Further north the shortness of the growing season prevents double cropping and only a single crop of cereals is taken each year.

Rice the Predominant Crop

Six main crops furnish more than four-fifths of the calories in the Japanese diet from indigenous sources. These crops are rice, wheat, sweet and Irish potatoes, barley, and naked barley. Rice, which is by far the most important crop grown, occupies more than half of the total cultivated area and about two-fifths of the total crop area. Rice is the predominant crop because it is better adapted to the long growing season than other cereals and can withstand the high temperatures and humidity which are a marked feature of the summer in southern Japan. About nine-tenths of the rice crop is grown on the irrigated lowlands and the balance on the terraced uplands.

Wheat and barley cannot be grown successfully during the hot, humid summer of central and southern Japan, and there they are grown during the winter. In northern Honshu and Hokkaido they are grown as a summer crop.

Sweet potatoes are grown extensively in southern Japan and white potatoes in the cooler areas.

Serriculture, which was one of the most important agricultural occupations of southern Japan before the war, was encouraged by the mild winters, humid climate, and cheap labour. The industry flourished in latitudes south of 40 degrees, but further north the climate proved too cold for the mulberry trees to grow. During the war the silk industry received a severe setback, many acres of mulberries being cut down and the area used for food production. The Japanese tea industry had much the same fate and is now being slowly rehabilitated.

Vegetable culture is an important part of the agricultural life of Japan. The chief crops are white radish, turnips, spinach-beet, cabbage, string and soya beans, broad beans, lettuce, tomatoes, and onions. Fields of eggplant, taro, and lotus are a common sight in southern Japan.

Most of the work on a Japanese farm is done by hand. A primitive wooden plough is pulled by a draught ox or horse, but planting, manuring, weeding, and harvesting are done by hand. Hours of work are long, and during the long summer days both men and women toil in the fields from morning till late at night. The women work just as hard as the men and do the bulk of the monotonous tasks such as planting and cultivating the rice crop.

Hillsides Terraced

Though most of the hill country is in bush or forest, hillsides terraced and under cultivation from top to bottom are a common sight in parts of southern Japan. These terraces, arduously constructed by hand, represent years of toil and help the peasant to eke out a scanty living. The terraces are usually very narrow and go up the hillside in steps varying from 4 to 6ft. apart. They are often faced with stone and sometimes with turf. Nearer the foot of the hill the terraces get wider until they merge into the valley floor. All the cultivated land, on hills or on the plains, is levelled so that the fields may be irrigated.

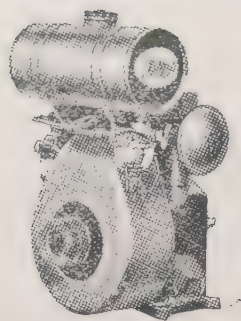
Many farmers among the New Zealand troops have pointed out that much of the hill country could be cleared and grassed for stock production. But the hub of the Japanese farming industry is found on the low-lying flood plains. All this country is extremely liable to flooding, and unless the hills are clothed with a permanent dense cover to absorb the heavy rain and to guard against erosion the risk of disastrous floods would be too great, as the existing rivers could not possibly cope with the quantities of water that would pour down from bare hills after the torrential monsoonal rains.

Livestock production is of minor importance in Japan. The bulk of the cattle are used for draught purposes, and the number of milking cows is small. Dairying is confined mainly to northern Honshu, where the average dairy unit consists of 5 or 6 cows. Pigs are used as scavengers and kept in close confinement. There are seldom more than two pigs to a farm unit. There are about 200,000 sheep, mainly in northern Honshu.

The fruit industry is quite extensive, though the acreage under fruit was considerably decreased during the war, when the State forced many orchardists to pull out their trees and grow rice. The most important fruit crops grown are apples, pears, peaches, citrus, persimmons, loquats, grapes, cherries, and plums. The Japanese have conducted extensive researches into fruit growing, and have much information, particularly on persimmon and citrus culture, that should be of interest and value to New Zealand orchardists.

As may be expected from its intensive agriculture, Japan is a large consumer of commercial fertilisers, and in 1937 used more than 3,500,000 tons. Since the war production has been reduced to a tenth of that figure and rigid rationing is enforced. The most important fertilisers are superphosphate and sulphate of ammonia, though there is a fairly high production of organic fertilisers, mainly soya bean meal, other oil-cake meals, fish meal, and bone meal. There is also a good response to potash in southern Honshu when this fertiliser is obtainable. The widespread use of nightsoil is a marked feature of Japanese farming and has been largely responsible for keeping the fields as fertile as they are.

Here is a style of farming that has been developed through the centuries to reconcile a very large population with a comparatively small area of cultivable land. If the aim of Japanese agriculture has been to produce the maximum of food irrespective of all other considerations, it must be admitted that this object has been achieved to a large extent. It is doubtful if there will be any drastic fundamental change in agricultural practice in the country, at least while 70,000,000 people have to depend on 15,000,000 acres for the bare necessities of life. Modernisation and increased mechanisation might spell disaster to millions of Japanese farm workers who would be deprived of a living unless industrial life were organised to offer other avenues of employment to those people. That must always be a major consideration when attempting any type of agrarian reform in Japan.



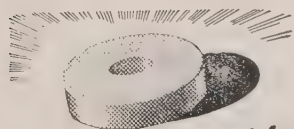
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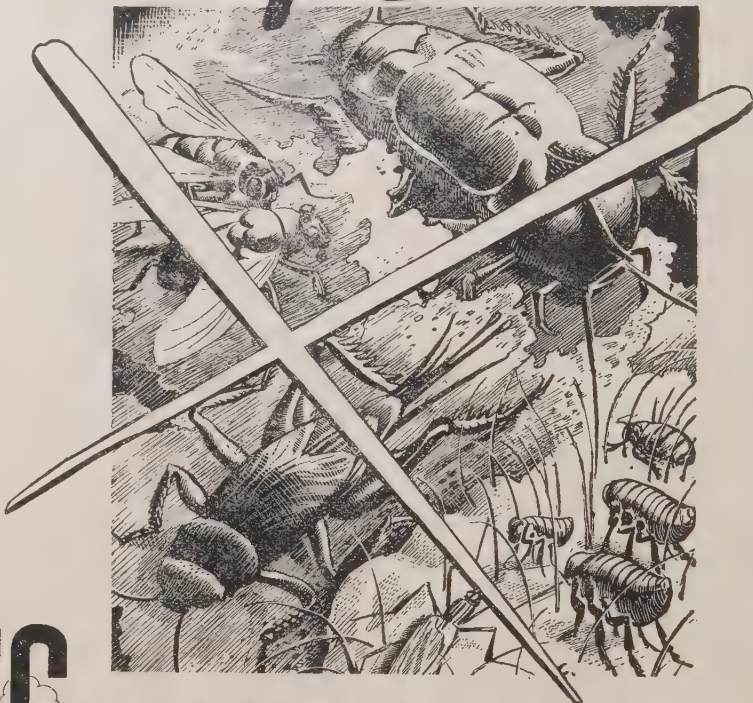
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Role of Phosphates In Rehabilitation of the Tennessee Valley

By N. LAMONT, Assistant Irrigation Officer, Christchurch.

PHOSPHATE topdressing has become a matter of farm routine in New Zealand, on the more accessible country at least, and as a general rule, except perhaps in wartime, the significance of the role phosphate has played in national development is forgotten. The viewpoint of the Tennessee Valley Authority agriculturists can be appreciated only by thinking back 30 or 40 years in New Zealand history to the time when many of what are now the richest dairying districts were fern-covered and undeveloped, the pastures were poor and unproductive, and the cattle affected with all varieties of bone diseases caused by phosphate deficiency. But whereas New Zealand began using phosphate on almost virgin, sparsely-populated country, the Tennessee problem has all the additional complications arising out of the existence of an established agriculture which was undeniably heading for disaster.

BY no means a prosperous farming area, the Tennessee Valley was being ravaged by soil erosion of a type unknown to New Zealand. Years of continuous row-crop cultivation of maize and cotton with a minimum of soil-protecting pasture had laid waste areas very moderate in slope by New Zealand standards. Even now some rivers flow sluggishly with the weight of their burden of topsoil stripped from the farms and being deposited in navigation channels and hydro-electric dams. In short, all the practices that had been built up by tradition and habit for generations were opposed to the best interests of the valley.

Revolution in Farming Practice

That was the problem TVA had to face. A revolution of farming practice and, more difficult still, a reorientation of point of view was the job given to phosphates, because phosphates made productive pastures possible—pastures that would anchor the soil and feed the livestock that would enable the farmer to live prosperously from his few eroded acres without eternal row cropping, and in doing so not only secure the dams and waterways against excessive silting and revitalise the agriculture of the region, but also make possible at least moderately prosperous rural communities of healthy people.

What is in New Zealand just another commonplace farm operation is to TVA a vital factor in the regeneration of a region and a people. Only the unique integrating philosophy of TVA could align all the pieces of the puzzle

to fit phosphate into the gap for which it is designed. Finally, superimposed on a problem of such magnitude was the further complication that the exhaustion of local high-grade phosphate deposits was clearly in sight, and even low-grade deposits were far from limitless. Not only the Tennessee Valley but the whole U.S.A., in the not far distant future, must look for supplies to the relatively remote north-west, where almost unlimited deposits of phosphate exist. The greater degree of livestock farming, involving greater areas devoted to pasture, so necessary in the interests of soil conservation and the health of

The many-sided character of the Tennessee Valley Authority, an organisation known throughout the world as an outstanding example of regional planning in the interests of the people, was referred to in a previous article. TVA is not only a commercial enterprise, a Government department, or an institution for promoting the public welfare, but operates according to the principles of all three, and so contrives to co-ordinate the efforts of all interests and promote the welfare of all sections of the community, urban as well as rural. The agricultural developments in the TVA area are of interest both because they constitute a commendable technical achievement and because of the part they have played in contributing to the planned and balanced evolution of the Tennessee Valley region.

the people, was ultimately to depend on phosphate a thousand miles away from many areas needing it most.

The problem was complicated, and the solution depended on an appreciation of the relative importance of all the issues involved. Considered purely as a technical problem the issue was comparatively simple. Long hauls and high freight charges on the one hand appeared to limit use of remotely-located but ample deposits, while the low phosphate content of the limited but more accessible local deposits in effect presented the same problem. It was at once obvious that 15-20 per cent. P_2O_5 content phosphate could not be hauled long distances and sold to farmers at a price that would stimulate the widespread use considered necessary.

Concentrated Phosphates

After a period of experimenting, TVA's chemical engineers began the manufacture of concentrated phosphates on a sufficiently large scale—some hundreds of tons a day—to enable them to explore thoroughly the commercial possibilities of a fertiliser which, being much higher in phosphate content than those previously available, would in effect reduce freight charges on phosphate.

Although improvements are still being discovered, a practical proposition has now been developed for producing three phosphatic fertilisers containing 28, 48, and 65 per cent. of P_2O_5 . New Zealand standard superphosphate contains only 20 per cent of P_2O_5 . The two most concentrated types, "triple super" (48 per cent.) and "Metaphos" (65 per cent.) reduce freight and hauling charges to less than one-half and less than one-third respectively.

The chemistry and engineering processes involved in the manufacture of these fertilisers will not be discussed fully. Briefly, elemental phosphorus is extracted from phosphatic rock and added to other rock to build up the total phosphate content. For "triple super" the extra phosphorus is added in the form of phosphoric acid; for "Metaphos" the rock is treated with phosphorus pentoxide vapour produced by burning elemental phosphorus. Many complex technical problems had to be solved before these processes were successful, and an important feature was that the process depends on abundant and cheap electric power. Again is demonstrated the unification of effort that is a vital feature of the TVA approach. Hydro-electric dams and waterways, whose future might some day be threatened by excessive silting and progressive poverty in the rural community, both resulting from severe soil erosion, by providing cheap abundant power and transportation

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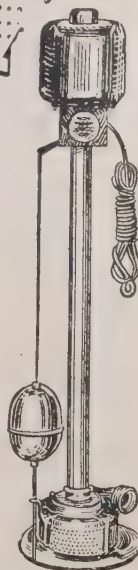
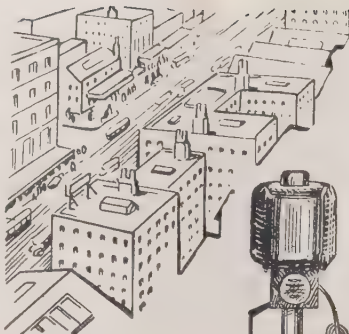
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... PHOSPHATES IN TENNESSEE VALLEY



The area of TVA, 42,000 square miles, compared with the total area of the United States.

have made possible the development of phosphatic fertilisers which in turn will play a major role in regenerating the soils and rehabilitating the rural and urban population of the region.

"Demonstration" Farmers

A strictly commercial outlook is part of the basic TVA philosophy, but they are content to reap economic reward at points often remote from the point at which expenditure occurred. That point of view is responsible for the fact that to date none of the thousands of tons of TVA concentrated phosphatic manures produced has been sold for cash. The whole output has been supplied free of charges other than freights to selected "demonstration" farmers—selected by meetings of fellow-farmers in the area. Some 24,000 such farms are located in the TVA region and a like number are scattered throughout the U.S.A.

A whole farm may be a clumsy unit for accurate economic research work, but to the farmer not a plot or a paddock but the whole farm is the economic unit. Furthermore, the whole farming system required to be altered and an almost entirely new type of over-all management substituted if the agricultural problem in the valley was to be solved. For that reason relatively large-scale production of fertilisers was undertaken for experimental purposes. Laboratory production and small plot experiments were very promising, but the value of phosphates and the new farm management principles involved had to be tried and demonstrated on a farm scale before wide acceptance by the farming community could reasonably be expected.

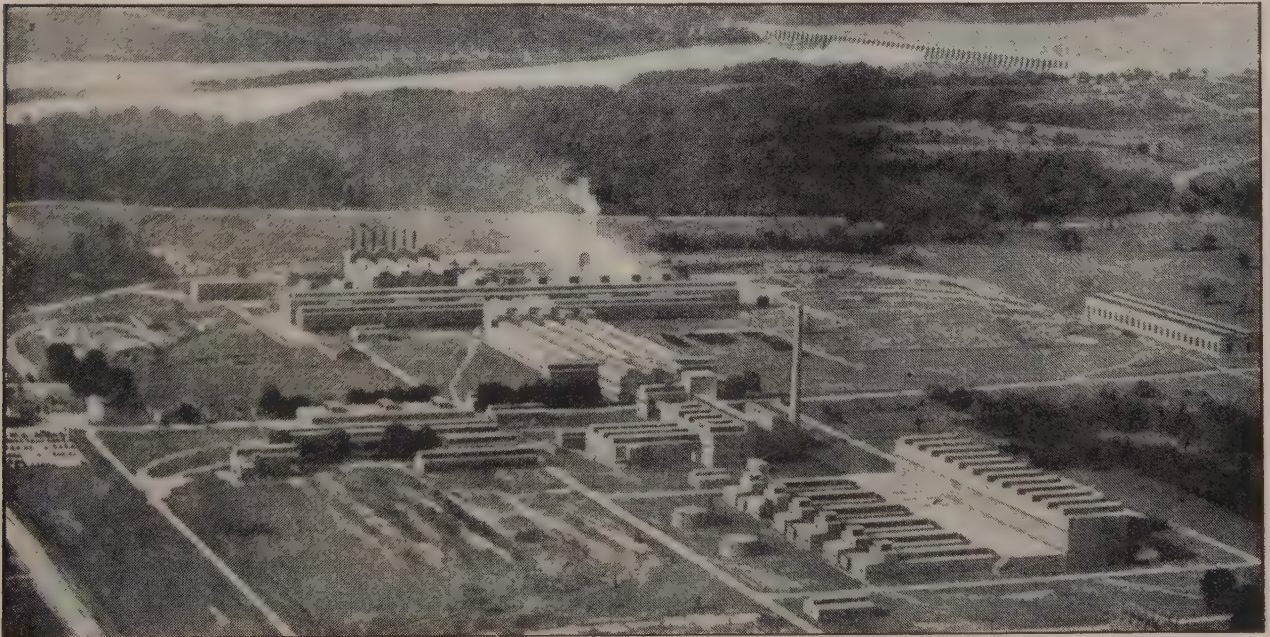
By comparatively large-scale production of the new phosphatic manures at their Muscle Shoals plant, the TVA chemical engineers have shown that commercial production is practicable, and by applying them to demonstration farms the TVA agriculturists have in turn shown that the use of these fertilisers is practical and economic on a farm scale. One measure of the success of the campaign is that throughout the TVA region annual purchases of phosphate from ordinary commercial sources (not including TVA production) have increased to

four times that bought when TVA began operations; in one county the increase has been ten-fold. Furthermore, records have shown big increases in the acreage of pasture and of lucerne, lespedeza, and other fertility-building legumes. There has been a corresponding reduction in the area of maize and wheat, but in some cases it has been associated with an increase of total production of these crops because of much higher yields.

TVA has "invested" large sums in its phosphate experiments, in factories and on farms, and the direct cash return to TVA has been negligible. In increased business in the region's towns and cities, in increased stability, prosperity, and health of the people the return must be immeasurable.

Economic Security

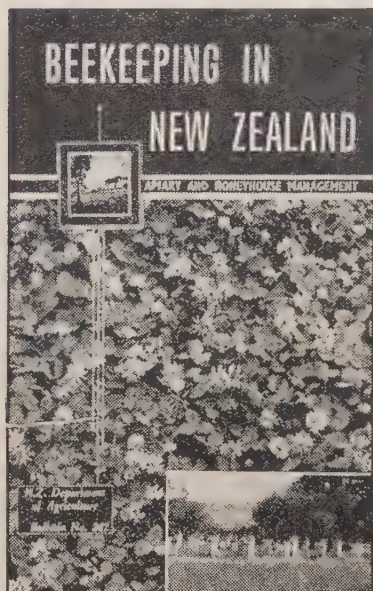
Ten years of practical experience have amply demonstrated that good-quality pastures established and maintained by regular phosphatic top-dressing can not only revitalise exhausted soils and halt erosion, but can establish a new type of pastoral livestock farming which will give to the farmer economic security. That view was expressed frequently when inquiries were made about the purely economic angle of this process of conversion from row-crop to pasture farming.



Chemical works near Sheffield, Alabama, where TVA work on concentrated phosphates is carried out. The Wilson Dam and Tennessee River are in the background.

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Written by T. S. Winter, Senior Apiary Instructor of the Department of Agriculture, Bulletin No. 267, "Beekeeping in New Zealand," is the first book to deal authoritatively with every aspect of apiary and honeyhouse management under New Zealand conditions. Containing 140 pages and more than 180 illustrations, it will meet a long-felt demand for a complete manual on the subject.

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. . . PHOSPHATES IN TENNESSEE

While there was no doubt that the economic aspect of the conversion was sound, of even greater significance to the farmer was a deep sense of security—a feeling that the terrible cycle of erosion was halted and reversed, and confidence that he was no longer compelled to submit to overwhelming natural forces, but had in his own hands the power to safeguard the future of the soil.

Idealism and Vision

The vigorous and practical way in which TVA agriculturists have attacked their problem is of particular interest to New Zealand in that the aim of Tennessee is to change a row-crop agriculture into something approaching the pastoral type typical of New Zealand. In doing so the TVA workers are employing the agent which is largely responsible for New Zealand's success—artificial phosphatic fertiliser.

This purely technical problem is viewed by the TVA regional planners not as an isolated problem but as an integral part of their over-all plans for the rehabilitation of the Tennessee Valley region. Already a large measure of success has been achieved, reflected

not in the balance sheets of the TVA organisation but in the increased prosperity of farmers and business men in the community and in a higher standard of living among the people as a whole.

The brief contact made with some of the individuals playing a part in this project was indeed stimulating. True, they are idealists and visionaries, but their idealism and vision pervade the whole organisation, and it is those very qualities which have enabled them to secure the enthusiastic co-operation of the people of a region about the size of the South Island and with a population approaching four million. Theirs is the kind of vision that has harnessed a disorderly river, converted it into a 650-mile water highway, and eliminated the constant fear of devastating floods by massive ferro-concrete structures which at the same time provide more than two million horsepower of electrical energy. Theirs, too, is the kind of idealism that, translated into improved farm practices, is arresting physical and economic deterioration of Tennessee's farm lands and in innumerable other ways is demonstrating the success of a technique of development that has no equal anywhere.

Illustrations by courtesy of TVA.

Old Farmhouse near Warkworth



This old farmhouse, about 200 yards north of the Puhoi Bridge on the main highway near Warkworth was built about 1875 for his brother by the father of Mr. Ed. Schischka, Puhoi. It was lived in by this family for many years and later by two granddaughters, the Misses Leyland, to whom it still belongs. About 55 years ago the house was reshingled and was occupied until about 40 years ago. The original timber is still in good condition, but the back part of the house was removed some years ago.

Winter Work in the Apiary

By E. SMELLIE, *Apiary Instructor, Christchurch.*

AN important factor in apiary management is to have plenty of spare supers and frames ready in advance of requirements. This work should be attended to in the winter and not left until spring, when the beekeeper's time will be fully occupied among the bees.

THE principal work for the winter will be overhauling or removal of all spare supers, bottom-boards, hive covers, etc., as well as the machinery and plant in the apiary buildings. Beekeepers who use a saw bench to manufacture their own hives will be kept fully occupied. All new materials required for the coming season, either for making hive increase or for renewal purposes, should be procured as soon as possible. This also applies where manufactured hive materials are to be purchased from dealers.

Preparations for Increase

Beekeepers who have gained sufficient knowledge to enable them to operate a larger number of colonies and who intend to enlarge their apiaries during the next season should now be making preparations, and the first consideration is to have a plan. The number of colonies it is intended to operate should be decided upon now and the necessary material for making increase secured.

Where there are 10 colonies in the apiary and the beekeeper decides to operate 20 next season he will either have to buy or make an additional 10 hives complete with roofs and bottom-boards. Each of the new hives will require at least two extra supers, so that a minimum of 30 supers will be necessary and 300 frames, each of which will require to be assembled, wired, and fitted with full sheets of comb foundation. As there are usually about 7 sheets of comb foundation to the pound, about 44lb. would be required to fill the new frames; also a small quantity of bulk beeswax to secure the foundations into the frames where the single-groove type is used.

Where the beekeeper prefers shallow or half-depth supers above the brood chambers it will be necessary to allow four supers to each hive, and 400 half-depth frames would be required. The same amount of foundation comb would be needed, however, as the full sheets are cut into halves to fit these frames.

Standard Equipment

Beekeepers who intend to manufacture their own equipment are advised to adhere strictly to the Langstroth specifications, as these are a standard which enables a free interchange of all apiary equipment between apiaries. Ac-

curate work and correct measurements are of paramount importance. Neglect in either of these details will cause much trouble in the management of an apiary.

Supers

Timber most commonly used for hive bodies is *Pinus radiata* and rimu (red pine). Where dressed timber is available the boards are best purchased in 12ft. lengths 10in. wide by $\frac{5}{8}$ in. thick. Five superficial feet or six running feet of this timber will make one super. After the timber has been well seasoned it should be dressed to a width of 9 $\frac{1}{2}$ in. to allow for any further shrinkage that may take place after the supers have been nailed up.

The standard measurements of a super ready for use are:—

Outside: 20in. long x 16in. wide x 9 $\frac{1}{2}$ in. deep.

Inside: 18 $\frac{1}{2}$ in. long x 14 $\frac{1}{2}$ in. wide x 9 $\frac{1}{2}$ in. deep.

If metal rabbets are to be used, the inside cut at the top of each end section of the super should be $\frac{3}{8}$ in. deep; if no rabbets are used, the cut should be $\frac{1}{2}$ in. deep only.

To assist in preserving supers it is advisable to give the joints a coat of paint or old car oil before nailing them together.

Floor-boards and Lids

Floor-boards can usually be made up from odds and ends of suitable timber, but the main consideration is to make a standard type so that they are always interchangeable. The runners are best made of either 4in. x 2in. or 3in. x 2in. timber and the strips

of wood attached to the top edges to make the entrance may be from $\frac{3}{8}$ in. to $\frac{1}{2}$ in. thick.

Flat-top hive lids are more popular than the gable type, and are recommended. When making up the hive covers (lids) care should be taken to ensure that well-seasoned timber is used and that the dimensions of the lids will allow them to slip freely over a standard hive body. Hive lids that have shallow sides or are made of light timber are easily blown off the hives. The timber used should be substantial and the sides at least 4in. deep.

More detailed information of home-made hive equipment is available in Bulletin No. 267 obtainable at 2s. 6d. (post free) from any office of the Department of Agriculture.

Painting Hives

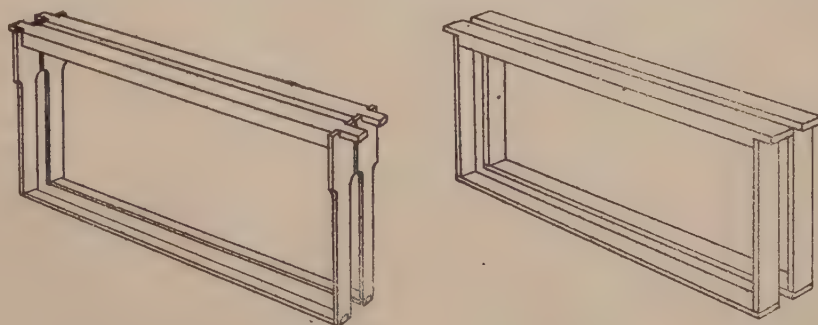
All hive equipment should have the exterior surfaces painted with at least two coats of good paint. The first coat of priming can be given with red lead and raw linseed oil, or, alternatively, used sump oil. Good-quality paint should be used for the finishing coats.

Making Up Frames

When all the necessary hives are made and painted the frames can then be nailed up and wired in readiness to receive the foundation comb. Frames cannot be made satisfactorily by the beekeeper unless he has a suitable set of circular saws and woodworking machinery.

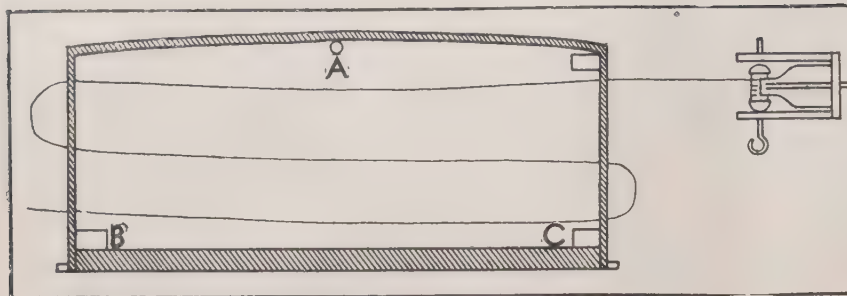
Many beekeepers prefer to use the Hoffman self-spacing frames, which can be purchased from dealers in the flat ready for assembly. When purchasing the frames a quantity of 1in. and 1 $\frac{1}{2}$ in. flat-headed nails should also be ordered.

To assemble the frames first place the top bar on the bench with the groove facing upward, then push the end bars into position and nail on the bottom bar with 1in. nails. Next reverse the frame and secure the top bar to the ends with 1 $\frac{1}{2}$ in. nails. A



Types of frames in general use in New Zealand: Left—Hoffman self-spacing. Right—Simplicity.

WINTER WORK IN THE APIARY . . .



A wiring board makes the wiring of frames rapid and simple.

rack to hold 20 or more frames at a time for nailing is best for large beekeepers.

Wiring Frames

There are various methods of wiring frames. One of the most rapid and simple is with the wiring board illustrated. The bottom bar of the frame is hooked over the peg A and the top bar is drawn down over the lower blocks B and C, as illustrated. When the frame is in this position a $\frac{1}{8}$ in. tack is partly driven into the narrow edge of the end bars—one above the top right-hand hole and the other above the lower left-hand hole. Wiring is commenced at the top right-hand hole and, to make three parallel wires, is finished at the lower left-hand hole, where it is wound around the tack, which is then driven home. The wire is tightened by hand and

wound around the top right-hand tack. The tack is also driven home and the wire severed to complete the operation.

When the frame is lifted off the blocks the bottom bar straightens out and causes further tightening of the wires. It is important that the wires are taut to prevent sagging of the foundation and breakage of combs later in the extractor.

Foundation Comb

The wired frames are best stored in supers to prevent warping until the beekeeper is ready to insert and embed the comb foundations. This work should not be done until the warmer weather or a few weeks before the combs are required on the hives, as the wax is brittle and is apt to be broken when handled during the colder months.

IMPORTATION OF STOCK

Direct Shipments Permitted from Great Britain

THE direct importation of livestock from Great Britain to New Zealand is now permitted by the Stock Importation Amending Regulations, which came into force on March 20. Since 1924 there has been an embargo on the direct shipment of stock from Great Britain because of foot-and-mouth disease there, and importers have been required to domicile British stock in an intermediate country for a certain period.

THE following conditions are laid down by the amending regulations for the direct shipment of cattle, sheep, goats, and pigs from Great Britain to New Zealand

1. That permission to import is first obtained from the Minister of Agriculture.

2. That the stock have been in Great Britain from birth or for at least three months immediately before their removal to the British quarantine station.

3. That each shipment of stock is accompanied by:

(a) The statutory declaration of the owner to the effect (i) that the stock have been domiciled in Great Britain for the necessary period; (ii) that they are free from disease at the time of removal to the British quarantine station and have remained free from disease during the preceding three months; and (iii) that they have not been in contact with diseased or infected stock during the period stated.

(b) A certificate of inspection and examination by a veterinarian employed or approved by the British Ministry of Agriculture and Fisheries

to the effect (i) that within 30 days before removal to the British quarantine station the stock were examined and found to be free from disease; (ii) that, in the case of cattle, they were subjected to the tuberculin test and the Johnin test with negative results; (iii) that, in the case of cattle, they were either subjected to the agglutination test for brucellosis with negative results or that the examining veterinarian was satisfied after due inquiry that the cattle had been vaccinated against brucellosis; and (iv) that, in the case of sheep, goats, and pigs they were subjected to the agglutination test for brucellosis with negative results.

(c) A further certificate from a veterinarian employed by the British Ministry to the effect (i) that the stock were detained in the British quarantine station for at least 14 days immediately before shipment; (ii) that they had remained free from disease while in quarantine; (iii) that all fodder or litter supplied for shipment with the stock was obtained from districts known to be free from foot-and-mouth disease for six months immediately before shipment and had not been exposed to infection or contamination during that period; and (iv) that, in the case of sheep or goats, they had been dipped while in quarantine in a scab-destroying preparation approved by the certifying veterinarian.

4. That on arrival in the Dominion the stock are quarantined for 30 days commencing from the date of inspection by a Government veterinarian.

To bring the regulations governing the importation of cattle and sheep from other countries into line with the conditions of entry for these classes of stock from Great Britain the amending regulations include the following modifications of the conditions of entry of cattle and sheep from other countries:—

For cattle from Canada the period of domicile in Canada has been reduced from six months to three; the veterinarian's certificate accompanying the cattle must include a statement that the animals were either subjected to the agglutination test for brucellosis with negative results or that the examining veterinarian was satisfied after due inquiry that they had been vaccinated against brucellosis; and the quarantine period on arrival of the cattle in the Dominion has been reduced from 60 days to 30.

The quarantine period on arrival in the Dominion of cattle from the United States of America has been altered from 60 days to 30, cattle from Tasmania from 40 days to 30, and sheep from Canada from 28 days to 30.

The alterations to the period of quarantine establish a uniform quarantine period in the Dominion for all cattle, sheep, goats, and pigs imported from overseas countries.

CULTIVATION OF FUCHSIAS

FEW shrubs produce such a long show of flowers every year as fuchsias, which are easy to grow out of doors in most parts of New Zealand. This article by J. P. Hudson, Horticulturist, Wellington, deals with the cultivation of fuchsias in the home garden.

FUCHSIAS, which rank among the most popular of free-flowering shrubs, comprise a relatively few species, mostly from South American countries, and a considerable number of larger-flowered hybrids. Many of the species and varieties have been imported from Britain, where fuchsias enjoyed a great vogue last century as plants for the conservatory, for summer bedding out of doors, and even for the dwellinghouse window.

The first plant is said to have been introduced to England by a sailor at the end of the eighteenth century and grown in his window, where an enterprising nurseryman saw it, acquired it, and worked up a stock which created considerable interest.

Choice of Site

The ideal situation for fuchsias is a warm corner, sheltered from biting winds and shaded from the midday



Brilliant—red and purple fuchsia.



Marinka—scarlet fuchsia.

sun, where they can be given a deep soil which is rich in humus and does not become waterlogged in prolonged wet spells. In those circumstances fuchsias will grow to perfection out of doors in all but the coldest districts, but they often grow quite well even where conditions are not ideal. It is a measure of the plant's worth for the home garden that it does so well in relatively unsuitable places.

Sharp frosts in the winter may kill the tops of fuchsias down to soil level, yet the root will often survive to throw up new shoots in the spring. In colder districts the root stock can be protected by covering it over in the autumn, as described later.

In the colder inland districts, where heavy frosts are almost certain to occur in the winter and the ground freezes, it is best to grow fuchsias in large tubs or pots which can be taken under cover for the cold winter months.

Preparing the Soil

Before planting dig the site as deeply as possible, but without bringing the lighter-coloured subsoil to the surface, and at the same time work a generous dressing of compost or rotted animal manure into the soil. Thorough preparation of the site before planting does much to ensure the later success of the plants.

Fuchsias grow quite well in a moderately acid soil. A dressing of lime need be applied before planting only if the soil is very acid, in which case 4oz. of carbonate of lime (ground limestone) a square yard should suffice.

Propagating Fuchsias

Fuchsias are usually propagated from cuttings, which root easily any time from spring to autumn. Nurserymen use a propagating frame with bottom heat and, of course, get very rapid rooting; but fuchsias can be propagated quite well in the home garden in a cold frame. Pieces 2 to 3in. long, free from flower buds, cut off close beneath the bottom leaf and with the lower leaves removed, should be inserted in a cold frame, watered in, and shaded from the sun until they are rooted. In summer they can even be rooted in the open by putting them in the soil in a shady place, watering them in, and covering them with an inverted glass jar, which should be removed and wiped out once a day.

The main point in rooting fuchsia cuttings is to prevent them from flagging during the first few days by maintaining a moist atmosphere around them and shading them from the direct rays of the sun.



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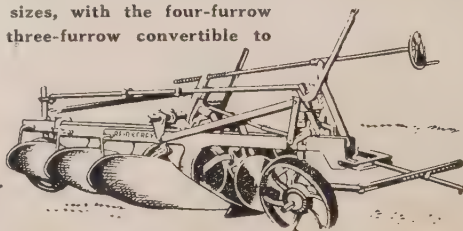
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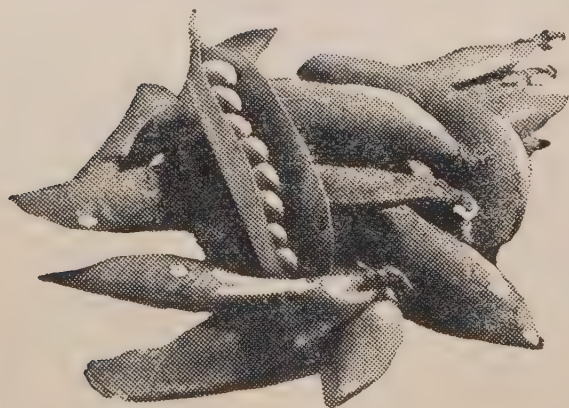
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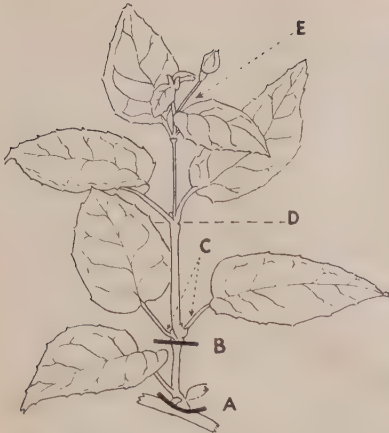
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... CULTIVATION OF FUCHSIAS



Fuchsia cuttings should be 2 to 3in. long, cut off at (B), just below a leaf, or torn off from the main branch with a small heel of old wood (A). The lower pair of leaves should then be cut off at (C), any flower buds removed (E), and the cutting inserted in the soil up to (D). Cuttings without flower buds root better than those with buds, even though these are removed.

Planting Out

Garden varieties of fuchsias will make bushes from 2ft. to 7 or 8ft. in diameter, depending on the vigour of the variety. The distance apart at which they are planted should differ with the variety, giving each plant ample space in which to develop its characteristic form.

In the first years after planting temporary fillers of fuchsias or other plants can be used between the permanent bushes; but the fillers should be removed as soon as the permanent plants are well developed, even though that leaves the bed looking rather empty in the spring.

Fuchsias achieve their maximum effectiveness if each bush develops individually; masses of them growing into each other are not so effective. Fuchsias are especially suitable for planting on banks, where the passer-by can look up at them and see the flowers from below.

Feeding and Watering

Fuchsias are hungry and thirsty subjects, especially when growing vigorously and flowering in the summer. Each spring the whole bed should be given a dressing of complete flower border fertiliser (3 parts of blood and bone, 2 parts of superphosphate, and 1 part of muriate of potash) scattered evenly over the surface at 2oz. to the square yard and hoed in. Later, in hot dry spells, they should be given an occasional soaking with water, and they may also be fed from time to time with liquid manure diluted with water to the colour of weak tea.

In addition, an annual dressing of compost or old animal manure, applied to the surface in early summer, will help to keep the bed in good condition.

Lime should be used only on soil which is markedly acid, where an annual dressing of 2oz. of carbonate of lime a square yard may be applied to the surface in early winter and raked in.

Pruning

Various systems of pruning are advocated, but hard pruning seems to pay best, as fuchsias flower on new shoots, which are produced most freely if the bushes are cut hard back each year.

Shoots or branches which have died in the winter should be cut off in the spring.

Thin, weak, and straggling shoots should be cut out altogether. The remaining healthy shoots should then be shortened, the strongest back to within about 6in. and the weaker ones to about 1in. from their bases.

Precautions in Cold Districts

A wide range of species and varieties of fuchsias is available in

New Zealand, but not all can be grown satisfactorily outdoors, as some are less hardy than others.

Even in cold districts a selection of the more hardy sorts can be wintered if the base of each plant is covered 6in. deep with a mound of sand or fine cinders in autumn after all the branches have been cut back to within a few inches of the ground. The root stock will usually survive low temperatures which would kill the branches.

The protective material should be carefully removed in the spring, when new shoots usually grow up from the base to flower later in the season.

Varieties

Here is a short selection of popular varieties; many others are offered by New Zealand nurserymen, some of whom carry extensive collections of fuchsia varieties:—

Tom Thumb: Dwarf red.

Avalanche: Double, brightly-coloured, violet and red flowers, pale-coloured foliage, medium growth; plant 4ft. apart.



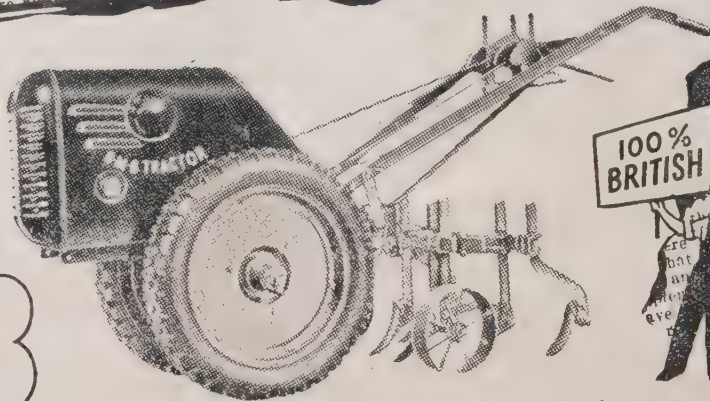
Hard annual pruning keeps fuchsia bushes small, even when they are quite old, as shown by the gnarled trunks of this specimen.

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Ballet Girl: Large, showy, semi-double, white and scarlet flowers.

Duchess of Edinburgh: Very large, double, white and carmine flowers.

Fascination: Long, single, white and pink flowers; plant 3 to 4ft. apart.

Jubilee: Large, double, crimson and mauve flowers.

Victor Hugo: Large, double, purple and red flowers. Plant 5ft. to 6ft. apart.

Native Tree Fuchsias

The tree fuchsia (*F. excorticata*) or kotukutuku is an attractive shrub or small tree with relatively inconspicuous purple flowers and black edible berries which the Maoris call "konini." It is one of the very few native trees which display autumn colours, losing each year a proportion of its leaves which depends on the amount of frost. There is also an attractive variety with purple leaves.

If planted in good soil the tree fuchsia grows rapidly enough to make it useful in the garden.

Species for the Rock Gardens

The native *F. procumbens* (often called *F. Kirkii*) has slender trailing stems clothed in summer with small, waxy, greenish-yellow flowers borne on erect stems—unusual for this family. The flowers are interesting because of the unusual blue pollen produced by the anthers, but the greatest attraction of this species is the appearance of the shining, pale-red berries which are enormous compared with the flowers.

F. pumila is also recommended by Farrer as "quite hardy and most decorative for the rock garden in warm soils and countries."



Fuchsias make attractive standard plants which should be firmly staked.

Fuchsia Hedges

F. magellanica var. *Riccartonii*, with graceful, pendant, Turkey red and purple flowers, is hardier than most types. It will grow in alkaline soils and tolerates the wind fairly well, even when planted near the sea. When an occasional severe frost cuts this species to the ground in winter it usually grows up again from the base.

This type has been given an Award of Garden Merit in England, a distinction conferred only on plants which are of first-class value for garden decoration. Another fuchsia which has received the same award is *F. m.* var. *gracilis*, a more elegant but less vigorous and rather less hardy type which should grow well in New Zealand gardens.

Both these fuchsias, and especially the former, are used for hedging in the milder and moister parts of Britain, where they make most attractive flowering hedges, especially when planted on top of banks or retaining walls. In mild districts fuchsia hedges may be clipped to shape in the spring, but further trimming later in the season will reduce the number of flowers. Fuchsias are not suitable for closely-clipped, formal hedges.

Pot Plants

Fuchsias make good pot plants, ideal for growing in the home glasshouse or for room decoration. For this purpose early-spring cuttings are usually used, but where a heated glasshouse is available cuttings can be rooted in autumn and the plants kept growing through the winter; these will flower early and can be grown into large plants in the first season.

For the best results pot them into a fertile compost (John Innes potting compost), stand the plants in partial shade, and water them regularly, but do not apply water unless it is required.

Plants are usually trained by pinching out the centre at every third or fourth pair of leaves until a shapely foundation has been built up. They are then allowed to grow without further stopping, and should begin to flower about 6 weeks after the last time of stopping.

When they are growing strongly water them every 10 days with liquid manure diluted to the colour of weak tea. Red mite and thrip attack can largely be avoided by syringing regularly with water.

Plants should be turned round from time to time to prevent growth from becoming lop-sided. Never allow them to become dry, especially when the flower buds are developing, and avoid draughts, as a cold draught or temporary dryness at the roots can cause

... CULTIVATION OF FUCHSIAS

the flower buds to drop off. On the other hand, over-watering pots, leading to waterlogging of the soil, can also cause bud drop.

Pot fuchsias are best grown annually from cuttings, but if old plants are to be kept for a further season, they should be dried off in the autumn. When the leaves begin to turn yellow and fall withhold water altogether, and when all the leaves have fallen off put the plants in a cool, dry, but frost-free place for the winter.

In the early spring the plants should be brought out again and watered with tepid water. When the buds start to grow shake the plants out, re-pot them, and prune them back hard to within an inch or two of the base.

Little staking is usually necessary. A thin cane to the centre of each plant, to which side shoots can be looped up, is all that is required.

Hanging Baskets

Fuchsias make ideal plants for furnishing hanging baskets, as the beauty of the flowers is best seen from below. Ballet Girl is a variety well suited to that purpose. The native *F. procumbens* also makes a very attractive and interesting plant for a hanging basket.

Diseases and Pests

Fuchsias are relatively free from diseases and pests, though the leaves are sometimes attacked by pests, especially in dry weather and when growing in unsuitable situations.

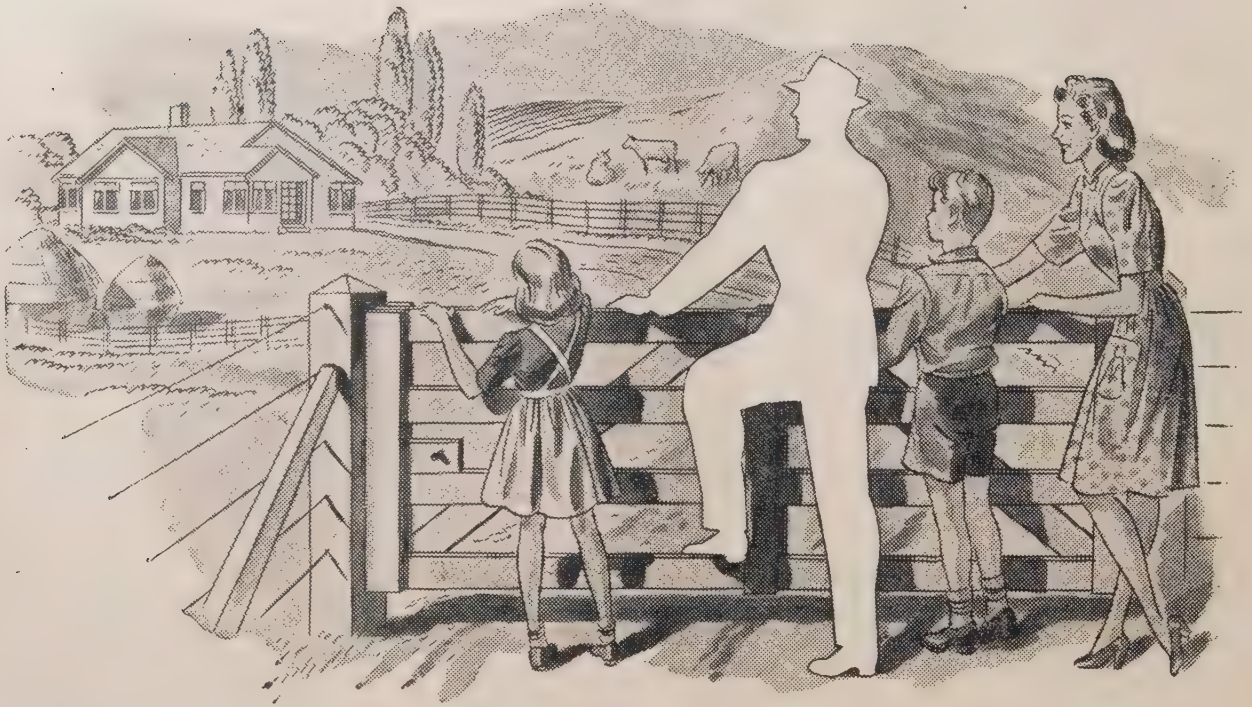
Red mites, which live on the underneath surface of leaves, feed by puncturing the leaf, from which the juices are extracted. Infected leaves at first show light-coloured, whitish spots, and later look rusty, brown, and withered.

Thrips may also feed on the foliage, causing a characteristic scurvy silvering or browning of the leaves.

Both these pests can be controlled, if necessary, by spraying with a nicotine wash made by dissolving 2oz. of soap or soap powder in hot water and adding it, with 1 fluid ounce of nicotine sulphate, to 4 gallons of water. The wash is made even more effective by adding 1 per cent. of summer oil emulsion.

THE HYDATID DISEASE

New Zealand, in common with other sheep-raising countries, is notorious for the high incidence of hydatid disease in domestic stock and human beings. Measures which should bring about a substantial reduction and eventually the complete eradication of the disease are outlined in Bulletin No. 278, "Prevention of Hydatids." It can be obtained free from any office of the Department of Agriculture.



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Rowans, Red Rowans

DRIVING into Queenstown along a road where rowans grow, their pendant clusters of coral-coloured berries ablaze in the autumn sunshine, and looking upon the lake capital with its pine-girt peninsula and hillside homes set amid flowers and shrubs and sheltering fruit trees, it is hard to realise that it was once a town without trees. Yet in a photograph of Queenstown taken in 1866 there is not a tree to be seen, and even the hill behind the town is bare. But thanks to the far-sighted policy of some of the pioneers and the praiseworthy efforts of the present beautifying society, this lack has been remedied and the natural charms of the little white town by the lake enhanced considerably.

The gigantic Wellingtonias which tower high above the grey stone walls of the council buildings and shed their satiny, brown cones on the footpath are a species of Californian redwood and were planted in the seventies from seed specially imported from Canada by a Mr. Bolt who was then town clerk. He called them "trees of justice," as it was customary in his homeland to have trees outside the courthouse so that those awaiting trial or the giving of evidence might rest in the shade until it was their turn to be called.

The grandfather of the present town clerk was an authority on trees. He came to New Zealand from California with the gold rush in the sixties, but when he saw the beech forests at the head of the lake he soon forsook prospecting for the more certain wealth to be obtained from timber. "Our gold is in these trees," he said. Subsequent years proved the truth of his assertion, and in addition to his milling interests at Kinloch he engaged in ship building and was responsible for the construction of the two paddle steamers Antrim (named after County Antrim, Ireland) and Mountaineer, which plied up and down the lake for many years, providing a highly-necessary service in the carrying of passengers and goods. Longevity seems to be the rule where Wakatipu steamers are concerned, for the official photograph of the launching of p.s. Mountaineer at Kingston is dated February 11, 1879, and she was withdrawn from the service only about seven years ago. The sturdy little vessel Ben Lomond (which started life as Jane Williams, but was later rechristened) has already weathered 76 winters, and judging by her workmanlike appearance, she will doubtless survive to perform her duties efficiently for many more.

Nautical activities have not always been confined to the lake, however, for during the big flood of 1876 the water was so high in Queenstown's main street that rowboats were used as the principal means of transport in the town itself, and the foreshore parade could not be negotiated except by boat.

In 1859 and 1860 the population of Queenstown was estimated at 10,000, and later when the borough was incorporated the builder of the Antrim, Mr. J. W. Robertson, was elected the first mayor. Each of those early councillors had a street named in his honour, likewise the first settler in the vicinity, Mr. W. G. Rees, but the predominance of street names such as Ballarat, Brisbane, Hobart, Adelaide, etc., commemorates the continent whence came the majority of miners. (Future historians will be pleased that the minute books from the year 1866 onwards have been preserved intact.) A valuable survey map with its linkages and lettering just as clearly legible now as when penned 83 years ago shows that many of the sections in the heart of the town were originally tent sites, some of them merely a few perches in length. Other

interesting items displayed in the council offices include a handsome 12lb. specimen of native trout and framed pictures of Queenstown and the lake country in the olden days.

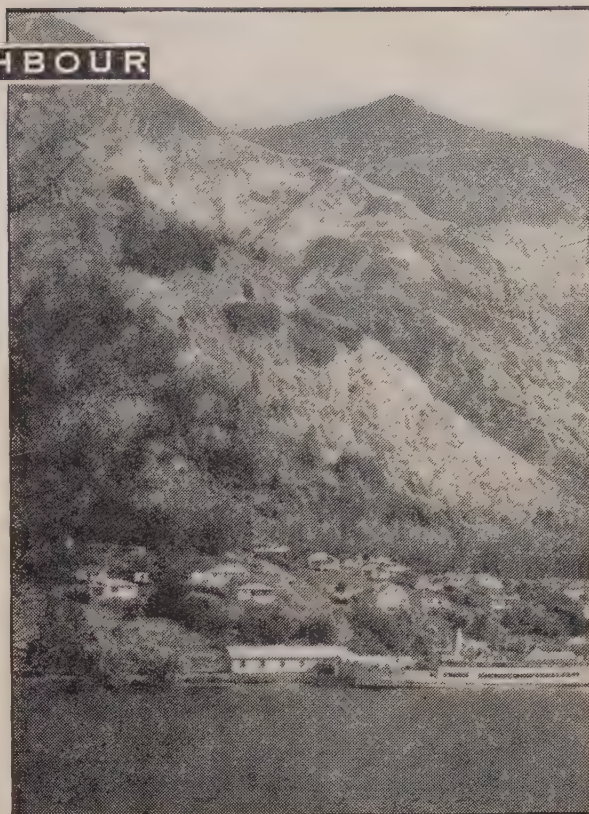
The library, too, has its share of "views," including an illustrated roll of Otago's soldiers who fell in the Boer War and selections of mineral specimens from different parts of the world. There are a number of New Zealand shells, also, and some cocoons and raw silk grown in Christchurch in 1882, and a small box of greyish fibre obtained from stone found near Martin's Bay, the ill-fated settlement on the west coast whose history of hardship, heroic courage, and endurance is soon to appear in book form.

In the lending section of the library are native birds stuffed and mounted in glass cases. The stilt and the crested shags have their slenderness accentuated by their proximity to a pair of plump kakapo parrots, but the brown-hued quail is quite overshadowed by a tiny parakeet with bright emerald plumage.

The youthful librarian has a Mount Cook lily growing in her home garden. It is rare indeed for *Ranunculus Lyallii* to flourish at such a low altitude. Two previous attempts at transplanting met with failure. However, the third experiment, made about 10 years ago, was entirely successful, this beautiful plant with its broad leaves and panicles of pure white flowers having been brought down from the mountains at the back of Queenstown by a miner, a veteran of the Boer War.

The trees of justice cast a cool green shade outside the library doors, the willow boughs make leafy traceries beside the bridge where a crystal stream goes singing on its way to join Wakatipu's blue, blue waters, and the sunlit town lies dreaming by the lake, its story as romantic and colourful as the rowans which glow upon the hills.

Many



MAKING BREAD WITH

By EVA TOPPING, *Rural Sociologist, Auckland.*

FOR the making of bread, tea-cakes, and yeast buns at home the handy packet of compressed yeast, received through the mail or local store, has replaced the home-made liquid yeast to a great extent, so saving time and work. There are many ways of making bread and similar foods, and though the underlying principles of using yeast are the same, the time taken for the rising and proving of the dough varies with different methods and recipes. A simplified and quicker-than-usual way of bread making which gives a good loaf is described in this article. Recipes and methods for making fancy breads, rolls, tea-cakes, and so on will appear in future issues.

How Yeast Works

A cake of compressed yeast is made up of many tiny yeast plants, each consisting of a single cell. Under favourable conditions these plants grow by "budding," each bud breaking away from the parent cell and forming new buds. The conditions required are warmth, moisture, and food (starch and a little sugar). Freezing checks the growth and hot water or a temperature higher than 130 degrees F. kills the yeast. In com-

pressed yeast the life of the plants is not entirely suspended, so cakes of yeast for home baking should be bought in small quantities, stored carefully until required, and used as soon as possible. If dark spots have appeared on the surface, some of the plants have died and the yeast will not raise the bread as well as if it were fresher.

When the yeast is put into the bread mixture it feeds on the starch in the flour, changing it into sugar. Then alcohol and carbon dioxide are formed, and when that gas is given off bubbles are formed in the dough, causing it to expand or "rise." To distribute these bubbles evenly through the dough the whole mass must be kneaded thoroughly. The yeast continues to grow until the dough is put into the oven to bake; there the high temperature quickly kills the yeast plants, but the gas expands and makes the dough rise a little more.

Making the Dough

Yeast, sugar, liquid, flour, and salt are the ingredients for plain dough; fat is included in some breads, and eggs, fruit, and flavourings are added to fancy doughs for tea-cakes, buns, and doughnuts.

YEAST.—The quantity of yeast used varies with the recipe, the type of flour used, and the method of



COMPRESSED YEAST

mixing. Small quantities of dough need comparatively more yeast than large quantities; $\frac{1}{2}$ oz. of yeast is needed to raise 1 to 3 lb. of flour, but $1\frac{1}{2}$ to 2 oz. is sufficient for 7 to 14 lb. of flour. Coarse flours need more yeast than white flours. More yeast is needed when the dough is required to rise and be ready for baking quickly than when a longer time can be allowed. Rich doughs containing fat and eggs also need proportionately more yeast, as the fat slows up the action of the yeast.

SUGAR.—A little sugar is added to the yeast to make it liquefy and begin working at once. Too much sugar will prevent the yeast from growing properly, so the quantities in the recipes should not be increased. When more sweetening is required the extra sugar is added to the flour before it is mixed with the yeast liquid. Usually not more than 2 teaspoonfuls of sugar are allowed for liquefying $\frac{1}{2}$ oz. of yeast.

LIQUID.—The necessary moisture can be water, milk, or a mixture of both. The amount is about $\frac{1}{2}$ pint to 1 lb. of flour; coarse flours may require a little more, and recipes using melted fat and eggs need less liquid. Milk should be scalded before use or the warmth dur-

ing the rising and proving may make it turn sour. It is also wise to boil the water, and both water and milk must be cooled to lukewarm before being added to yeast and flour.

FLOUR.—Good plain flour should be used for white bread. Variations are:

WHEAT GERM BREAD—1 tablespoon of wheat germ to replace 1 tablespoon of plain flour in each $\frac{1}{2}$ lb.

WHOLEMEAL BREAD—1 lb. of wholemeal, 1 lb. of white flour.

WHOLEMEAL AND BRAN BREAD—1 lb. of white flour, $\frac{3}{4}$ lb. of wholemeal, $\frac{1}{4}$ lb. of bran.

OATMEAL BREAD—Replace 2 tablespoons of flour in each 1 lb. with 2 tablespoons of fine oatmeal.

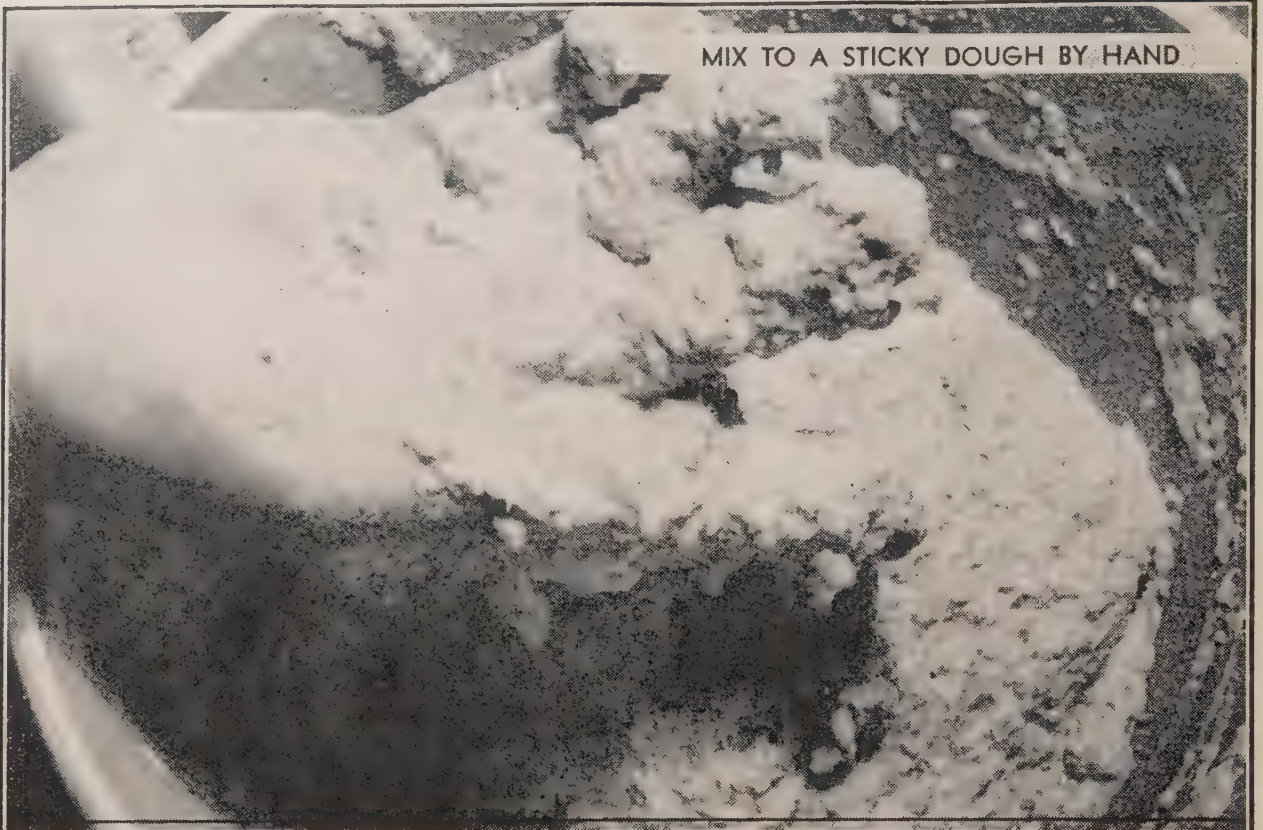
SALT.—Salt is necessary for savour, and the allowance is about 2 level teaspoons to 1 lb. of flour. Wholemeal bread usually requires an extra pinch or so, but too much salt in the dough prevents the yeast from growing quickly; for that reason salt should be added to the bulk of the flour and not to the yeast liquid or the first "setting of sponge" if that method is being used.

FAT.—Fat is included in some plain bread recipes and in fancy breads and buns, butter or lard usually



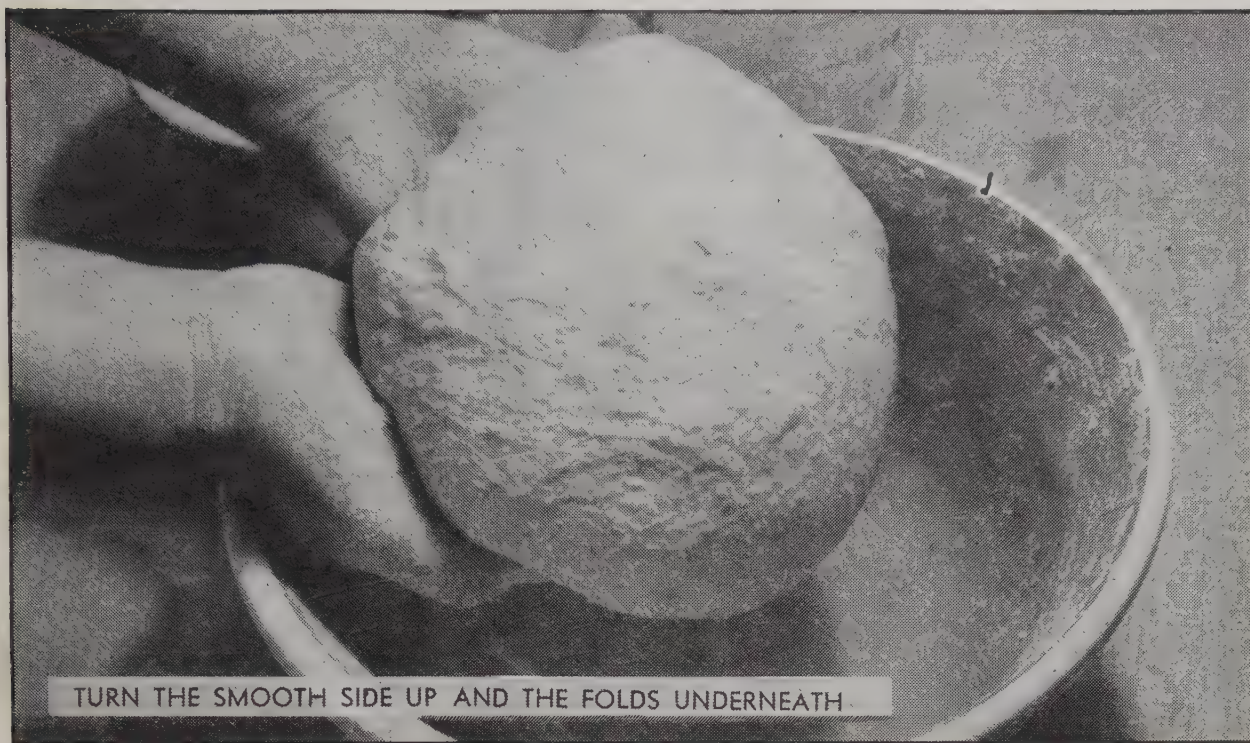
MAKING BREAD WITH COMPRESSED YEAST

MIX TO A STICKY DOUGH BY HAND



"KNEAD—UNTIL THE DOUGH IS SMOOTH AND LEAVES
THE SIDES OF THE BASIN AND THE FINGERS CLEAN"

MAKING BREAD WITH COMPRESSED YEAST



being used. Fat slows up the action of yeast, so no more than the recipe states should be used, unless the quantity of yeast is also increased.

Mixing

In bread making all ingredients should be lukewarm before they are mixed and kept warm during preparation until the moulded dough is put into the oven.

Warm a basin, measure the flour and salt into it, and stand it in a warm place. Crumble the yeast in a small basin, cover it with the requisite amount of sugar, and cream the two together until they are liquid.

From that point the method varies with the type of bread being made and the recipe. Sometimes a little of the flour is added to the yeast mixture and the liquid, mixed into a thin batter, and set aside in a warm place to rise; that is called "setting the sponge," and is often used when the bread making is started overnight. In quicker methods the liquid is added to the yeast and sugar mixture and stirred into the warmed flour and salt by the hand. It is then beaten and kneaded until the dough is soft but not sticky.

Kneading and Proving

In kneading the dough is worked with the hand, bringing the outer edges to the centre, lightly and quickly, and pressing down with the knuckles. This operation should be repeated until the dough is

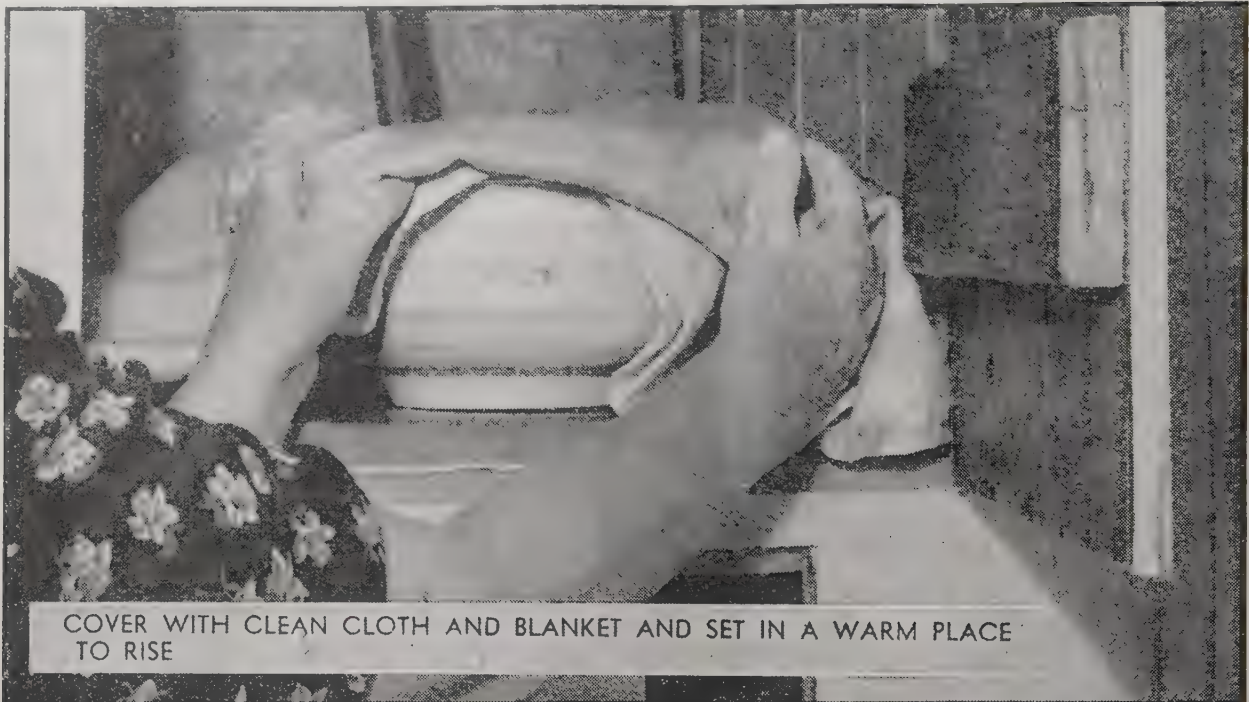
thoroughly kneaded, which is when a dent made by the finger quickly disappears when the finger is withdrawn. The dough will then be smooth and elastic and the basin free from particles, and a slight sucking noise will be noticed while kneading. Turn the smooth side uppermost and the "folds" underneath, and set the dough in the basin.

After being kneaded the dough is left to rise. It must be put in a warm place to enable the yeast to grow and give off carbon dioxide. Cover the basin with a clean cloth or tea towel and a piece of blanket, and put it on the rack of the range, in the hot water cupboard, or on a chair by the fire. It can be set over a pan of warm water if necessary, with hot water added at intervals to keep the temperature as even as possible. If a thermometer is available, keep the temperature at 80 to 83 degrees F.; at lower than 77 degrees the yeast will not grow properly and over 95 degrees it will die.

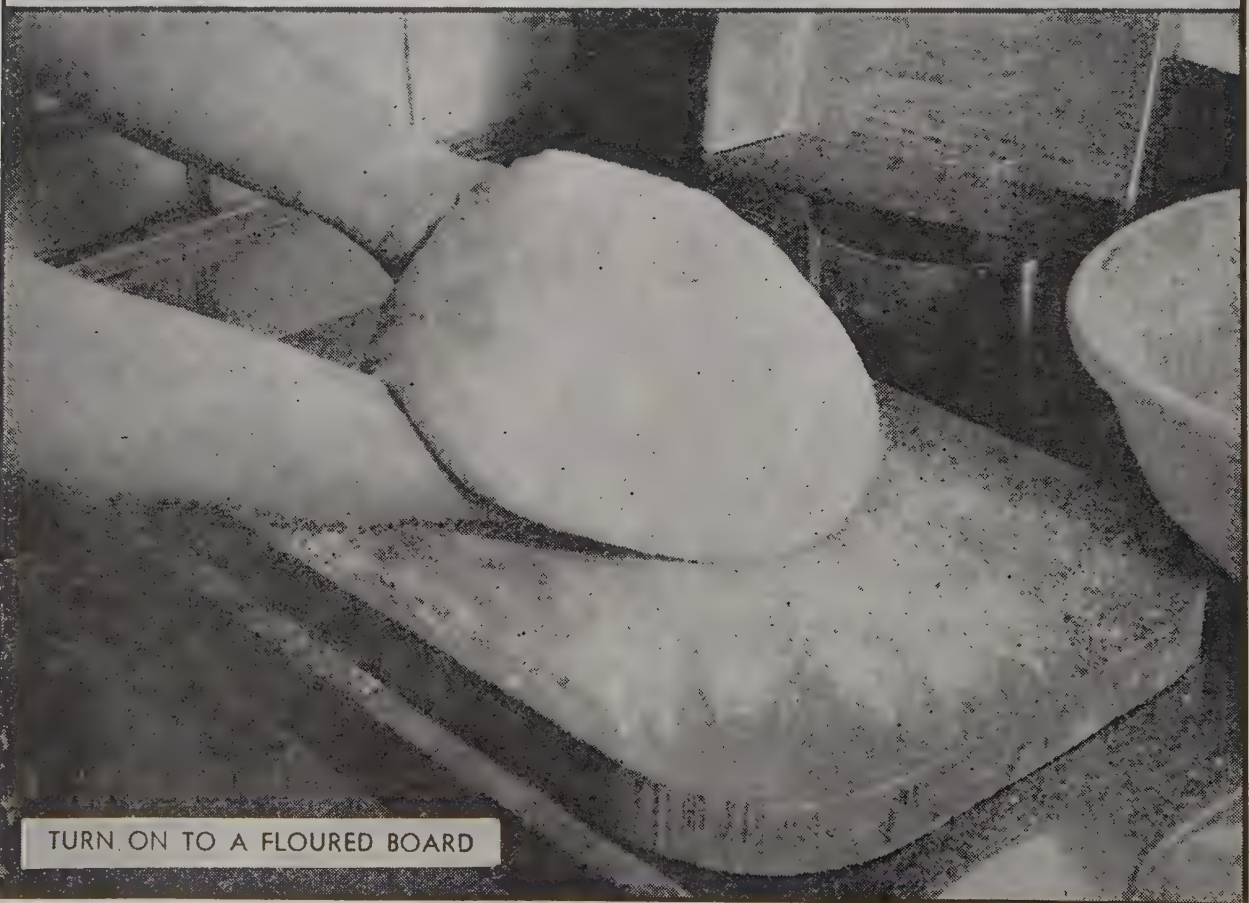
The dough is usually left until it has doubled its size; longer rising would result in too much fermentation and the loaf would taste sour. When sufficiently risen it is kneaded lightly again to distribute the carbon dioxide evenly through the loaf. If too little kneading is done, the loaf will be full of large holes; if too much, the gas will be allowed to escape too freely and the baked bread will be close.

Next the dough is cut into portions and shaped to fit the tins. Once again it has to be put into a warm

MAKING BREAD WITH COMPRESSED YEAST

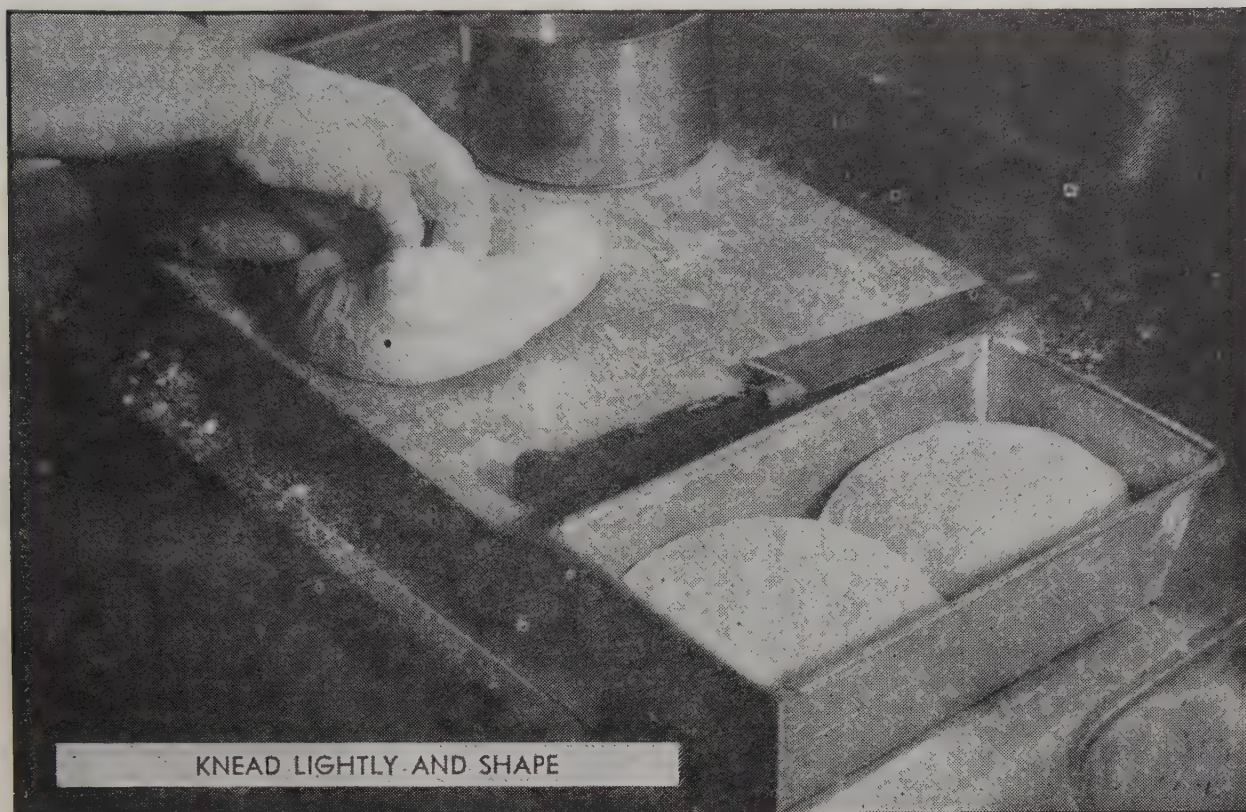


COVER WITH CLEAN CLOTH AND BLANKET AND SET IN A WARM PLACE TO RISE



TURN OUT ON TO A FLOURED BOARD

MAKING BREAD WITH COMPRESSED YEAST



place to double in size before baking, as during the second kneading the growth of the yeast was checked and further growth is necessary to obtain a good loaf.

Shaping

The tins should be prepared before the second kneading and shaping by greasing them well. Mould the dough to fit the sides of the tin and to little more than half fill it. Shapes—rounds, squares, oblongs, or double loaves—are a matter of personal choice and convenience. Cut the dough with a knife dipped in flour and, with floured hands, lightly mould it into shape, making the top smooth and putting all folds and creases underneath next to the bottom of the tin.

Baking

Bread should start baking in a hot oven for the first 10 to 15 minutes; then the heat can be reduced for the rest of the baking time, which will be from 30 to 45 minutes more, according to the size and shape of the loaf. When cooked the loaf is slightly drawn away from the sides of the pan, the crust is firm and evenly brown, and when taken from the tin and tapped lightly with the knuckles on the bottom the loaf sounds hollow. For a shiny top crust brush the loaf quickly with cold water immediately it is taken from the oven. Cool bread on a wire rack and do not store it until it is quite cold.

A well-made loaf should be evenly shaped and well risen, with a nicely-browned crust. There should be small even holes through the crumb; large uneven holes mean that the dough was not kneaded sufficiently, and large holes with a sour smell mean that it was allowed to rise for too long after the second kneading or that too much yeast was used.

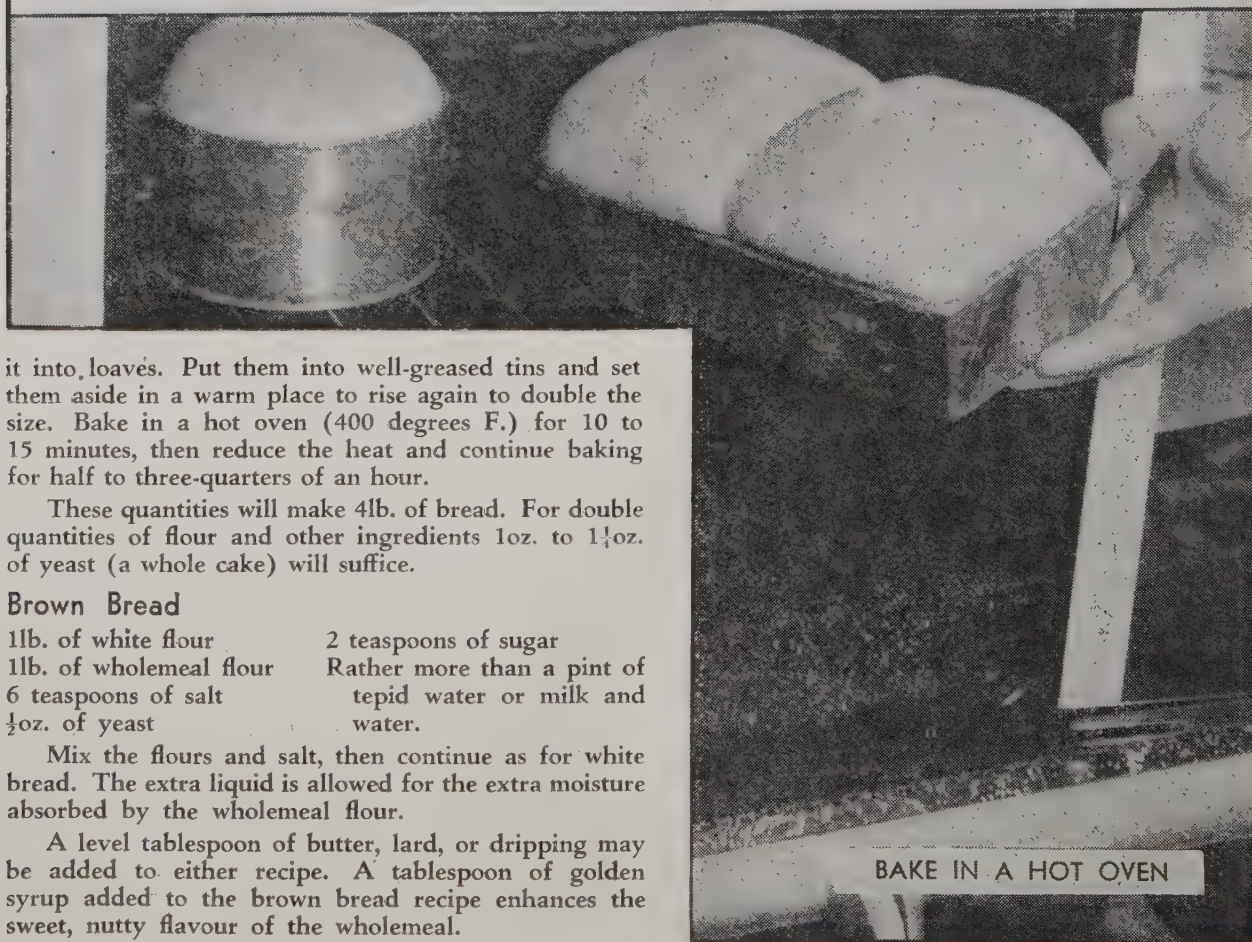
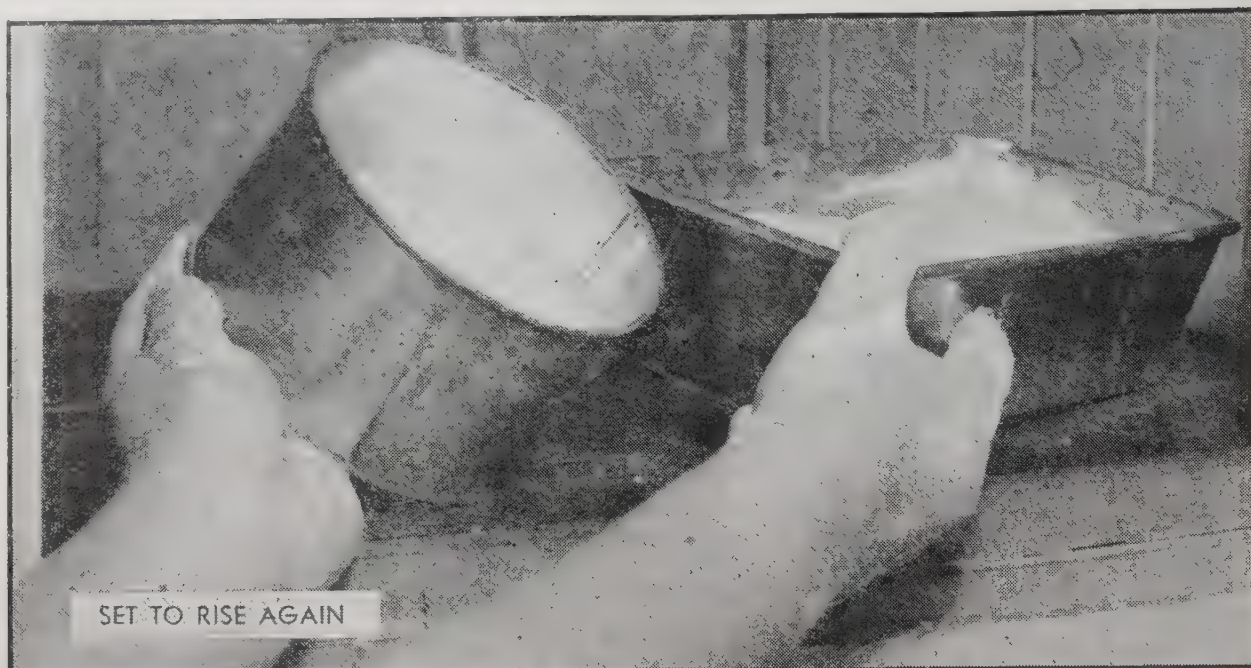
White Bread

Following is the standard recipe for the quicker method of bread making:—

3½lb. of flour	About 1½ pints of tepid
7 teaspoons of salt	liquid (water or half milk
¾oz. of yeast	and half water)
4 teaspoons of sugar	

Put the flour and salt into a warm basin and set it aside in a warm place. Cream the yeast and sugar until they are liquid, and add the tepid water (or scalded milk and water cooled to tepid). Make a well in the warmed flour and stir in the yeast liquid with the hand. Mix it to a sticky dough and knead for about 10 minutes—until the dough is smooth and leaves the sides of the basin and the fingers clean. Cover the dough with a clean cloth and rug or blanket and set it in a warm place until it has risen to twice the size. Remove it from the basin to a floured board, knead it lightly, cut it into portions to suit the tins, and shape

MAKING BREAD WITH COMPRESSED YEAST



it into loaves. Put them into well-greased tins and set them aside in a warm place to rise again to double the size. Bake in a hot oven (400 degrees F.) for 10 to 15 minutes, then reduce the heat and continue baking for half to three-quarters of an hour.

These quantities will make 4lb. of bread. For double quantities of flour and other ingredients 1oz. to 1½oz. of yeast (a whole cake) will suffice.

Brown Bread

1lb. of white flour	2 teaspoons of sugar
1lb. of wholemeal flour	Rather more than a pint of
6 teaspoons of salt	tepid water or milk and
½oz. of yeast	water.

Mix the flours and salt, then continue as for white bread. The extra liquid is allowed for the extra moisture absorbed by the wholemeal flour.

A level tablespoon of butter, lard, or dripping may be added to either recipe. A tablespoon of golden syrup added to the brown bread recipe enhances the sweet, nutty flavour of the wholemeal.

Photographs by Sparrow Industrial Pictures, Ltd.

Beautifying Walls and Banks

CONCRETE retaining walls, which are necessary in many New Zealand gardens, are among the most difficult garden features to beautify. Suggestions for clothing ugly walls and banks are made this month by J. P. Hudson, Horticulturist, Wellington.

THE development of many New Zealand towns and cities beyond the wildest dreams of their original founders has created difficult problems for city engineers and town planners in using land which would once have been considered far too steep for building.

Building on steep land has also created nightmare problems which often seem to defeat home gardeners. Concrete retaining walls, bare earth banks, and ugly terraces are far too common in gardens, yet these features can be made quite attractive by careful planting.

There is an outstanding example of this type of planting in a garden at New Plymouth built on a steeply-sloping section which has been carefully terraced into a series of flat beds, each with its retaining wall. The walls have been clothed with a variety of flowering plants and are sheets of vertical colour in the summer. Hardly a square foot of the original retaining walls can still be seen, which shows what can be achieved in a garden of this sort.

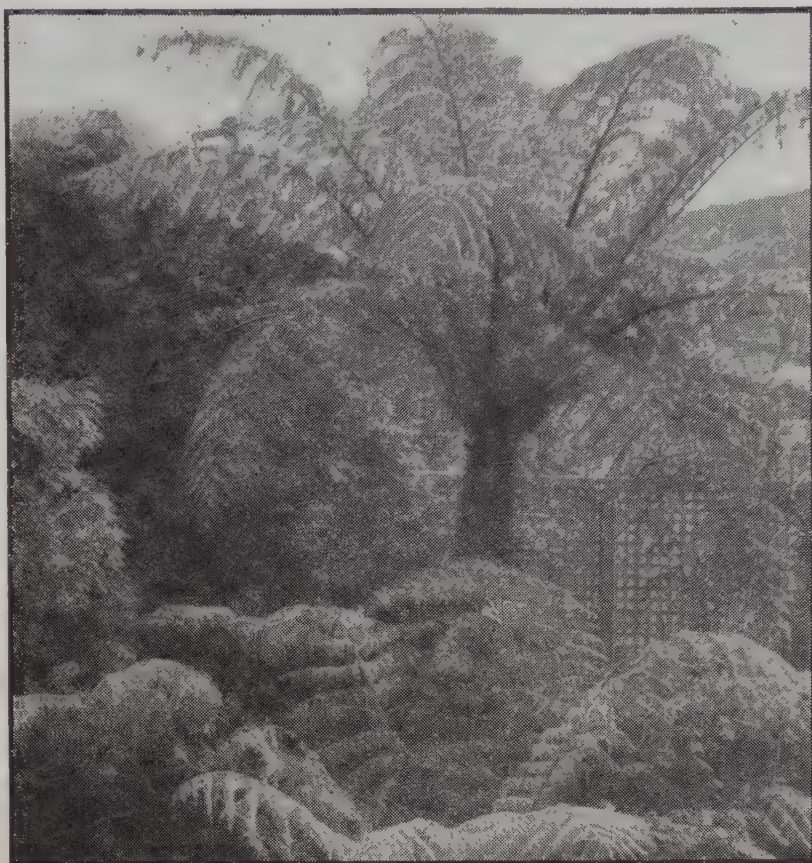
There is a wide range of climbers which can be planted in a border at the foot of a wall and trained up to cover it, but the problem is not so easily solved if plants cannot be planted at the foot of the wall, as, for example, where a path abuts the wall.

Where planting is confined to the top of the wall trailing plants are required and, moreover, ones which can tolerate dry conditions, as the border at the top of a wall usually dries out quickly and bakes in hot weather.

Recommended Trailing Plants

Some of the choicer trailing plants grow slowly or cannot stand dry conditions, but the following species can be thoroughly recommended for all except cold, frosty districts. The species are arranged in order of their rate of growth, the first being those which grow most rapidly:—

Carpobrotus (mesembryanthemum) edule L. (Hottentot fig or pig face): Though not a native, this plant now grows wild in many coastal districts.



Native tree ferns in a moist corner provide a restful evergreen setting with a distinctive New Zealand appearance.

The flowers are large and yellow and not very interesting, but the young growth is quite fresh and attractive, though rather coarse. When older plants begin to look untidy and bedraggled they should be cut back hard to encourage new growth, or replaced a few at a time by breaking off lengths and planting them between the old plants. When grown in good soil each plant will cover an area of 2ft. wide and 4 to 5ft. deep in a single season.

Convolvulus mauritanicus (Mauritanian bindweed) is a quick-growing trailer bearing a profusion of attractive blue flowers from spring to autumn. Planted 8in. apart along the top of a wall it will produce a curtain up to 6ft. deep in a season. This species does not get out of hand or spread like its notorious cousin the common bindweed.

There is a trailing *Mesembryanthemum* species, with much finer leaves than the first species described, which is covered with masses of pretty pink

daisy-like flowers from spring to autumn. Planted 12in. apart it will clothe up to 5ft. depth of wall in a season.

Gazanias are more attractive than any of the above species, but trail down more slowly, little more than a foot a year. The flowers close at night, but open fully in the sun. An illustration of *gazanias* growing on a wall was printed in the April, 1947, issue of the "Journal."

Ivy-leaved geraniums are ideal for trailing down low banks or walls, but grow too slowly to be satisfactory for clothing walls more than 2 to 3ft. high.

Kalanchoe (crassula) coccinea can also be used for trailing a foot to 18in. over a wall, and makes a useful "dot plant" to break a hard line of other plants. A disadvantage, however, is that its brilliant scarlet flowers last only 4 to 6 weeks in summer, though they make a bold and striking display while they are in flower.

BEAUTIFYING WALLS AND BANKS



After one season's growth trailing plants put out in a border at the top of this ugly concrete wall have clothed it to a depth of 3 to 4ft. The plant on the corner is *Convolvulus mauritanicus*. The other plants are *Mesembryanthemum* species.

Garden Work for June

Begonias (tuberous-rooted) to be flowered in pots are usually propagated by cuttings taken in September or October from corms which have been started into growth earlier, as plants of named varieties can be raised only by vegetative means. Where begonias are to be grown from seed, however, this can be sown in June in a fine compost if a glasshouse is available to provide warm growing conditions.

Cinerarias which have been planted out in milder districts in April in shady borders should be watched carefully, as they grow slowly at first and will still be relatively small plants, easily smothered if they remain covered with fallen leaves or wet rubbish.

Constructional work, such as re-making paths, walls, and rockeries, is usually undertaken in the winter when other work is not so pressing. Some home gardeners have a mania for constantly replanning their garden, which never has time to become established. It is often several years before a new planting settles down and becomes properly established, especially if it contains many shrubs. A garden constantly being remade never acquires that settled, peaceful appearance that should be the aim of every home gardener.

Early-flowering plants are always appreciated in the mixed flower border. Among those which flower regularly and freely, and are not grown often enough in the home garden, are leopard's bane (*Doronicum plantaginifolium*), with yellow daisy-like flow-

ers, very useful for cutting, on strong stems up to 3ft. high; *Saxifraga (megasea) cordifolia*, with showy pink flowers, 18in. high; and bleeding heart (*Dicentra (dielytra) spectabilis*) with rosy crimson flowers on stems up to 2ft. high.

Hormone weedkillers have been mentioned several times in these notes, with warnings about the dangers of allowing them to get on garden plants, especially tomatoes, which are so sensitive that a syringe or spray, once used for hormone weedkillers has hardly been safe to use afterward for any other purpose on tomatoes. The makers of one brand of hormone weedkillers now recommend that after using the chemical the syringe or spray should be pumped through with kerosene, then washed thoroughly in warm water, and finally rinsed by pumping clean cold water through at least three times.

Lawns can be kept in healthy growing condition only by paying proper attention to feeding. The surface should be dressed in June with a mixture of 3 parts of sulphate of ammonia, 2 parts of superphosphate, and 1 part of sulphate of iron, applied at the rate of 1oz. of the mixture per square yard.

Native tree ferns can be used in moist corners, even in small gardens, to provide a restful evergreen planting with a distinctive New Zealand appearance. As the leaves go brown and die they should be cut off near their bases, chopped up, and put on the compost heap. Nothing looks more untidy in a garden than a punga tree clothed in drooping dead leaves. In

the bush the leaves form a natural topdressing to the mound of roots at the foot of a tree fern, and if the leaves are removed for the sake of tidiness, a dressing of compost should be applied from time to time over the root mound to help to keep the trees in good health. Tree ferns soon begin to lose health and vigour if the root mound is left exposed to the sun by an over-tidy gardener.

"New Zealand cranberries" (*Myrtus ugni*) described in the November, 1946, issue of the "Journal" will hang on the bushes for a surprisingly long time when ripe. In Wellington last year the main picking was made from one bush on March 13, yet the last handful was picked on June 8.

Plant breeding is a fascinating hobby for the home gardener who has time to devote to it. Many important new varieties of garden plants have been introduced by keen amateur gardeners, one of the outstanding examples being the Russell lupins which created such a sensation a few years ago. Anyone interested in this subject is advised to read "Practical Plant Breeding," by W. J. C. Lawrence, published by Allen and Unwin at about 9s., which gives a clear picture of this rather complicated subject. Before starting to experiment in plant breeding time spent in reading up the subject to get an understanding of the principles involved will not be wasted.

Polyanthus, or, better still, primroses, can be used to make attractive spring displays in the house. Strong plants, with as many crowns as possible, should be lifted now, digging out a large lump of soil with each



Kalanchoe (crassula) coccinea can be used for trailing over a wall, and makes a brilliant display for a few weeks in the summer.

to avoid damaging the roots more than necessary. Wash the soil from between the roots and "pot" each plant into a small bowl, packing damp moss tightly between and around the roots. One well-grown polyanthus or two primrose roots will occupy a bowl 6in. in diameter. Stand the bowl in a light, sunny windowsill, and water carefully when the moss feels dry, but avoid over-watering, since the roots will rot (and the bowl will smell!) if the moss is waterlogged. The plants will grow and flower very attractively for weeks.

Roses often have a few late buds even at this time of the year. They do not always open properly outside, but if cut, placed in deep tepid water with the buds left above the surface, and put in a cool place over night, they will usually open out into perfect little flowers.

Thrift (*Armeria* spp.) flowers best if plants are divided every year or two. They should be dug up, the clumps pulled apart, and pieces replanted firmly. This work can be done any time in autumn or winter when the soil is not too wet for satisfactory planting.

Wallflowers often produce single strong main stems which should be nipped off as soon as they are noticed

to make the plants bushy and so encourage each to bear several spikes of flowers.

Weeding should continue whenever weeds are seen. In milder districts oxalis grows quite rapidly in the winter, and it is important that any plants seen now, however small, should be cut to the ground (see the longer note in the April issue of the "Journal"). It is wise to collect these plants rather than leave them on the ground, as they reroot so easily in moist soil, but it is quite safe to put them on the compost heap to rot.

Oxalis bulbs, however, should never be put on the compost heap, but should be burned at once.

Winter colouring can be added to the garden by planting deciduous shrubs and small trees with coloured barks. These include the dogwoods (*Cornus* spp.) with red and golden barks, golden-barked willows, silver birch, some of the barberries, and the white-barked raspberry. None of these plants, except the silver birch, can justify its place in a small section, however, as they are not particularly attractive in summer, and every plant in the home garden should have at least some merit all the year round.

All photographs by Photo News Ltd.

Mary Webb: "Heroine of a Fairy Story With a Sad Ending"

I FEEL sure that you must be an admirer of the work of Mary Webb, whose "Poems and the Spring of Joy" is my favourite bedside book. Recently I have come across two references to her which I thought you might like to share.

The first extract is by Caradoc Evans, a Welsh novelist and journalist: "Mary's handwriting was as pretty as dewdrops and I expected to meet a body as pretty. I met her by the Garrick Club at eleven on a morning. A spindly, earthy little woman came to me and said: 'I'm Mary Webb.' Her feet were biggish, her fingers were thin and trembly and long and like a sewing woman's, her nose was hooked, her neck was goitred, and her eyes were brilliant, bulging, glass marbles."

Also: "Mary thought more of her verse than her novels. 'You have no idea how hard I work at a poem,' she said. 'But stories—well, they just come to me and I write them without thinking and am as suprised as anyone at what I have written, so un-me it seems.'"

He also says: "All her life she had wished for riches, fame, applause, admiration, babies, and pretty dresses, and she got none of them. She is the heroine of a fairy story with a sad ending."

But oh, she had the gift of singing, didn't she?

The second item is really exciting and surprising. Recently 52 of her poems, hitherto unpublished, were found among the papers of her late husband, and they are to be published. I've suggested to my husband that a copy would be an ideal birthday present, though I shall not be able to wait till August for it if it appears in the bookshops soon.

Some years ago I found a poem by a New Zealand writer, L. C. Lesley House; it's a lovely tribute to Mary Webb:

GREEN MEMORY: LINES TO MARY WEBB.

All the lovesome things of earth
Lilted you to tears and mirth.
In the cadence of a bird
Ever your sweet songs are heard.
And I find you in a sonnet,
Blossom-white, with dews upon it.
In the streamlet's radiant gleam
Lives your bright perfidious dream,
And the soul of you is sweet
In the star above a street.
You lived at the washed tree's root,
Felt it's storm and knew its fruit.

—"Tinkle Tinkle," Dunedin.

National Health Requires Adequate Nutrition

WITH temptations of modern life causing so many wrong things to be eaten and drunk in the wrong balance, health has become something which must be sought after instead of being a natural corollary of living, writes an officer of the Department of Health. Good health has to be consciously made and improved.

GOOD health starts before we are born and so does poor health. A baby's chances of combating disease can be good or bad from the day of its birth, according to the ante-natal care exercised by the mother. It takes planning and effort on the mother's part to ensure that babies are born properly nourished and sturdy. It is the responsibility of the mothers to get the best knowledge available from ante-natal clinics or their doctors so that their own feeding and manner of living while baby is coming along will be beneficial.

Balance of Foods

Breakdowns in correct eating and general attention ante-natally give us babies below par, or may even cost the baby's life. The infant, the toddler, the school child, and the adolescent are all susceptible to the ill effects of inadequate diet. Adequate diet doesn't just mean feeding them; the balance of foods eaten in the household must be considered if the family is to grow fit. There must be enough fruit and vegetables, milk and eggs, and less of

the foods like meat, sugar, and starches than many households consume.

It is not likely that anyone would dream of stoking a fire with paper all night for the most satisfactory effect. Yet the quick-dying blaze and the choked-up grate of a fire of paper are a mild illustration of what can happen in our bodies with improper feeding

Growing Vegetables

As some of the best protective foods may be beyond the reach of the average purse today, some action is needed. If possible, grow your own vegetables and small fruit and keep fowls. Too few people are thinking about healthy foods and healthy living. When we do there will inevitably follow an appreciation of what a healthful diet is, and how to prepare the most beneficial and natural foods without destroying the essential nutrients. This is the first step to a fitter race.

Others will follow if you keep on thinking about building health—adequate sleep, rest, and play, and ade-

quate homes. But to gain national health adequate nutrition must be put first. First of England's wartime needs came adequate nutrition. As a result British people, even under wartime rationing, showed an improvement in the general national health because they were not able to spend their money on a lot of rubbish and could get better balance in their meals. The bread was altered to 85 per cent. wheat meal to give enough vitamin B, and calcium was added. A vegetable-planting programme produced more vitamin C from leafy vegetables and vitamin A from carrots. Margarine was fortified with vitamin A. There was a more equitable distribution of milk, with extra cheap and free milk for expectant and nursing mothers, toddlers, and school children. Meat shortages were eked out with dried egg and cheese. A fair distribution of protective foods among all classes of the people was assured.

All this came from thinking about health constructively. It is time we thought more about health instead of patching it up, for health is no accident, but simply what we make it.

BIRDS AND BUSH

I SPENT last weekend in the Catlins district, which I like very much, being a lover of the bush. On Sunday afternoon, in glorious sunshine, we went blackberry picking; and such blackberries—large, clean, and luscious. The road winds besides the Catlins River where bush and ferns grow in profusion. Dotted all over the landscape are the gnarled trunks of forest giants which have suffered in the fires that have followed man's progress through the bushland. Gaunt and grim they stand with blackened arms widespread as if in protest.

We passed an abandoned farmhouse where some hardy pioneer made a clearing long ago. The bridge which gave access across the river is now unsafe, but flowers still grow near the riverbank, mute witnesses that vanished hands brought beauty there.

To compensate for the sadness the shy bush birds abound here. Bellbirds chime in the trees and tomits, wax-eyes, and the lovely pied fantails flit hither and thither with their cheery twitterings.—"C.V.W.," Waverley.

WE must plant more native trees if we want the birds. In many parts of New Zealand pigeons and kiwis were almost extinct, but within the last few years where the bush has been encouraged to grow these birds have been seen in numbers. And aren't the pigeons beautiful? Yet fifty years ago sportsmen thought nothing of shooting them by the dozen. I would very much like to see a white-eye's nest.—"Susan," North Auckland.



[Sparrow Industrial Pictures Ltd. photo.]

Home-grown vegetables assist in maintaining a nutritious diet.

Preparing for Baby's Arrival

AN expectant mother spends many happy hours planning the requirements of the new baby. If it is the first, both father and mother require to budget carefully, spending their money wisely on things which are essential for their child's well-being. When they have settled on the finance available the mother usually has to make the final decisions on the items required. Some of the articles available are superfluous, even if attractive and dainty, so every mother is well advised to seek expert advice from the ante-natal clinic nurse and from friends who have had experience with babies. The purpose of this article is to give young parents practical help in deciding what is best for the baby. Many country mothers are unable to reach an ante-natal clinic and must shop by catalogue. The recommendations for materials are those of the Plunket Society, by whom this article was contributed.

THE chief items to be obtained are a cot and its bedding, clothing, bathing equipment, and pram.

By the time she is ready to obtain her outfit the young mother will have seen her doctor and the ante-natal clinic nurse about her health and diet. The nurse will show her samples of baby clothing and give many valuable hints about the design and quality of the materials to be used. She will know which shops are the most helpful and be able to suggest substitutes if some articles are difficult to find. Listening to the nurse carefully before buying is well worth while. Jotting



[Sparrow Industrial Pictures Ltd. photo.]
The ante-natal clinic nurse advising a mother about the preparation of baby's layette.

down a few points will save much time on the shopping expedition.

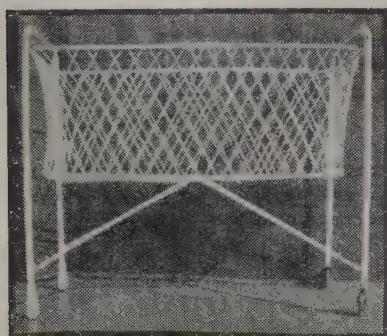
In choosing a cot look for one which is light yet firm, can be cleaned easily, and permits good ventilation. Plunket nurses advocate the wicker cot on a stand with two rear wheels, or a metal cot on a metal stand; the latter marks the floor coverings, but is economical when contemplating founding a family.

Fathers could do worse than follow the example of one ingenious man who made an entire cot and stand from enamelled dowelling rods that fitted into a board base, studded with holes for ventilation. The stand was of enamelled wood, and two legs had dinner-wagon wheels to allow the baby to be pushed easily from room to room and out into the garden. It was an economical yet efficient and attractive baby's bed, and most mothers would be proud to own it.

Canvas cots lack firmness and ventilation. They are improved by a three-ply board placed under the mattress and the use of a meshed canvas, but they are not as satisfactory from a health point of view as wicker or wire cots.

Two mattresses are always needed. One must be firm, made of horsehair for preference, with a strong ticking covering. That is the most expensive type, costing about £1 10s., but it lasts well. Well-buttoned wool, kapoc, or flax mattresses are also suitable.

A chaff shake-down mattress lies on top of the hard mattress. It is made of washable material and filled with chaff winnowings, obtainable on farms at harvest time or from flour mills.



A good type of metal bassinette.



Plunket nurses recommend a wicker cot.



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The Plunket nurse always knows where some can be found. Enough should be bought to fill the cover about one-third full, plus an extra pound or two for making two or three small pillows.

Pillows should be about 11in. by 8in. Large, soft pillows of down or kapoc are to be condemned, as they are dangerous. Every year some child smothers itself by pulling a soft pillow over its nose and mouth, so avoid them. The two extra pillows are for the pram. When they become soiled these shake-downs and pillows can be cleaned easily by washing the covers and baking the chaff in an oven for half an hour.

Bedclothes

Cot blankets have almost disappeared from the shops, but most mothers manage by using a single-bed blanket or by cutting one large blanket in halves for an enveloping blanket that goes under the mattress; the other half is used for small cuddling and carrying blankets. Without a good enveloping blanket the baby will not be snug.

It is an excellent plan to provide two cuddling blankets, one thin, of such a material as clydella or vyella, and another light woollen one. Occasionally a shop will be able to provide air-cell cot blankets in a mixture of cotton and wool. These wear well and shrink very little.

A piece of waterproof material about 15in. by 10in. placed over the shake-down protects the bed. Cotton material stitched to the sides helps to tuck it in well and keep it in the right place. The waterproof strip is covered by a piece of woollen material or old blanket so that baby will not feel cold or clammy.

Soft, double, butter muslin or fine sheeting is used to make a small sheet which is tucked over the top of the blanket to prevent chafing of the baby's skin.

A counterpane and head covering complete the cot outfit. They are usually made of a pretty, washable, floral cotton or hailstone muslin. They should match the colour scheme of the nursery and usually add a great

deal to the attractiveness of the cot. The head cover is a straight strip of the material fastened round the head of the cot by tapes to protect the baby's head from draughts.

Baby Clothes

Materials suitable for baby clothes are in very short supply, so wise mothers will begin collecting them early in pregnancy. Coupons can be obtained from Rationing Officers, but materials suitable for gowns and frocks and sufficient soft baby wool are not easy to find.

The minimum outfit of clothes that should be ready by the eighth month of pregnancy is:

- | | |
|---|---|
| 3 cellular cotton undervests | 4 flannel pilchers |
| 3 woollen singlets, or silk and wool in warmer climates | 3 dozen napkins |
| 3 petticoats | 6 bibs |
| 4 frocks | 2 pairs of bootees |
| 3 nightgowns | 2 double muslin binders 5in. wide and 1yd. long |
| 3 jackets | 1 shawl |

Friends and relatives usually provide such items as bonnets, bootees, and gloves, the supply of which is often much augmented. Suitable patterns are obtainable from Plunket nurses. The materials used should be soft, light, and warm to feel, yet able to stand frequent washing. For winter frocks clydella, vyella, or decalenta are suitable or, if they are unprocurable, spun silks and cottons, spun wemco, or lambspun. It is important that synthetic materials feel warm to the touch; they vary greatly in quality and price, but all wash well. Synthetic linens and pure cottons are suitable for hotter days, with organdie muslin or lawn for party best.

Nightgowns should be made with tucks on the shoulders and 24in. long; they will then last the child at least a year, as the tucks can be let out and the hems lengthened. Clydella, vyella, and decalenta stand wear well, but flannelette does not; furthermore it is highly inflammable and scorches easily when being warmed on a fire guard. However, if nothing better is available, velva winceyette is the most durable.

The three dozen napkins are essential. Those made of turkish towelling, 27in. square, are the most hygienic. Cheap brands of flannelette napkins do not wear well, but one or two dozen made of good quality flannelette are useful as they dry quickly.

Rubber pilchers make a baby's skin sore, so make four flannel pilchers that fit trimly, button up the sides neatly, and give good protection to outer clothing.

RECOMMENDATIONS FOR BABY'S WARDROBE



Baby's Frock



Petticoat



Alternate Style of Baby's Frock



Frock made from Nightgown Pattern



Nightgown



Marine Jacket



Flannel Pilchers



Cellular Shirt

PREPARING FOR BABY'S ARRIVAL . . .

Bathing Equipment

For bathing the baby, the following equipment is required:

- 1. A portable bath that can be cleaned readily and is light to carry. These can now be obtained from hardware merchants.
- 2. A low table or stand for the bath. The kitchen table can be used for the purpose.
- 3. A low chair for the mother who elects to dry and dress the baby on her lap. Some prefer to stand and attend to the baby on the table.
- 4. A bathing apron made of turkish towelling so that it can be washed easily.
- 5. Two bath towels, one large and soft for the body, the other a smaller face towel of double muslin.
- 6. Two washers, one for the face and head, the other for the body.
- 7. A toilet tray, which should be fitted with covered jars containing cotton wool swabs, old linen, olive oil,

baby ointment, baby soap, safety pins, needle and thread, pin cushion, nail scissors, hair brush and comb, and an empty jar for soiled swabs.

- 8. A chamber.
- 9. A covered bucket for used napkins.

Wicker Prams Best

Obtaining a pram was a problem during the war, as rubber wheels and wicker were not obtainable, but they are now coming back on the market.

Wicker prams are best suited to the New Zealand climate. Choose one that is light and capable of ventilation. See that the hood is sealed against air by American leather, and inspect its adjustments. For many weeks in the warm weather the hood need not be up at all. The hood should be lined with green cotton material to prevent glare harming the eyes and to allow air to circulate under the hood. The body of the pram should be lined with American cloth and the floor should be bored with holes to prevent stuffiness.

Down to Earth

OF all my annual holidays the one which I have cause to remember most vividly was spent "digging for victory." Cheerfully looking forward to a long trip in the South Island (I had the tickets safely in my purse), I was suddenly and literally brought to earth: official notification arrived to say that my services were required in one of the State vegetable gardens!

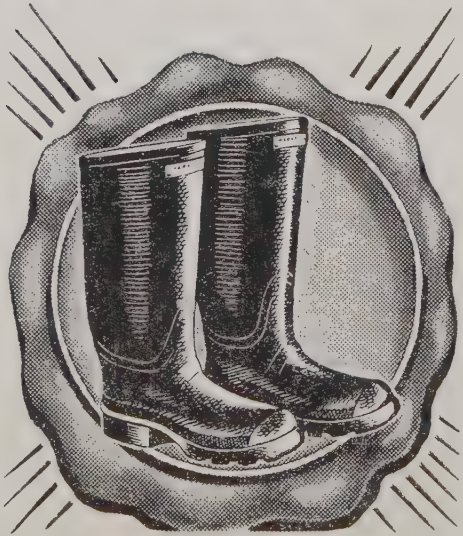
Up each morning at 6 o'clock, with a lunch to pack, 7.30 saw me panting up the road to scramble aboard the Army truck which carried its daily load of school teachers, students, and school children, plus blazers, sun bonnets, and lunch bags, to the scene of action, some five miles down a very dusty road. It seemed to us, novices that we were, that miles of lettuces, tomato plants, carrots, beans, and beetroot stretched in every direction, and all needed either hoeing, pruning, thinning, or picking. On each day but one during my time of hard labour the temperature was over 80°, and sunburnt legs, arms, and noses, with a becoming dusting of mother earth, were quite the fashion.

My most outstanding memories are of an erstwhile dapper, middle-aged schoolmaster puffing down his street to the waiting truck late one morning to meet the jibes of many former pupils about his lack of punctuality; of a large group of us hoeing industriously at a very weedy patch and receiving a shock when told, "Look out for those onion plants—you're hoeing them, too!"—it was news to us that there was anything more valuable than weeds there. And lastly, after what seemed like endless days spent in trying to distinguish between weeds and vegetables, returning home again with a hot, dirty face and an aching pair of legs, and hoping to avoid meeting any immaculate town friends.—"Pet," Te Awamutu.

A BOOK TO ENJOY

I'VE just read a review of Rita Snowden's book "A Thousand Sunrises" and it prompted me to tell you about a book I have enjoyed so much that I think other "Journal" readers would like it, too. It is called "Springbok in Sunshine," by Katherine L. Simms (published by Hutchinson), and is the story of the experiences, grave and gay, of a young couple who, although they have had no practical acquaintance with farming, set out to establish themselves on a sheep farm in South Africa. If those engaged in the same occupation in New Zealand who consider they live in the backblocks were to read this book I don't think they would feel they lived so far from civilisation after all!—"G.E.M.", Tauranga.

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When You Buy Furniture

THE importance of pencil-and-paper planning before making decisions about types of furniture to be bought for the home was emphasised in a previous article in this series by Norma K. Metson, Rural Sociologist, Wellington. The value of such forethought will be immediately obvious when the stage of visiting shops and making actual selections is reached. Knowing in advance what you want and how much you can afford to spend is a safeguard against unwise buying, whether it be paying so much for one item that others have to be skimmed, or being tempted by a bargain price to purchase something which, however good in isolation, will not fit into your general plan.

IN the preliminary stages you will have selected samples and done enough shopping around to give you some idea of the types of goods available and the price ranges to expect. Actual choices will then be easier and you will not waste time looking for things which are unobtainable or be suddenly embarrassed by discovering that an important article is twice the price which you expected to pay for it.

Good buys are those which, for the money spent, give good quality in construction and materials, functional design, and styles which are not likely to go out of fashion in the reasonable lifetime of the article. And, most important, they should be satisfactory to their owners—small chairs, no matter how admirable their construction and design, will not be comfortable for large people.

The furniture industry in New Zealand expanded very considerably in the years following the depression up to 1939-40, when 436 establishments employing 3287 persons produced furniture and cabinet work valued at nearly £2,000,000. This reflected the increased demand coming from higher incomes and postponed purchases. The value of furniture produced increased slightly for the next two years (this

indicates a rise in prices rather than quantity, as factories and persons employed were fewer), and in later years there was a sharp drop due to war conditions.

The situation now is disheartening for many young people who, for the first time, are looking forward to furnishing a home of their own. Supplies, though improving, are still short, and prices are high. Those who can wait a little longer before buying are wise to do so, leaving present supplies available for those whose need is urgent.

Questions Before Buying

Two basic questions have to be decided before buying. The first concerns the furniture itself, the second paying for it. Furniture may be bought ready made, it can be made to order, or it can be partly or wholly made at home. There are also possibilities in second-hand furniture.

Most firms have stocks for immediate sale, or show samples which can be duplicated in a relatively short time, and the range is wide enough to provide most things necessary for the average home. But if you have original ideas, oddly-shaped rooms, or special needs, it may be better to have some furniture made to order. It will

probably be rather more expensive than mass-produced units, but it may be worth the extra money to have precisely the article, wood, and type of finish desired.

Savings can be effected by ordering the article unfinished and painting or polishing it at home.

If you contemplate making loose covers for couch or armchairs, inquire about buying these pieces without upholstery. Remember, however, before making decisions to do work of this type yourself that both skill and patience are necessary if you are not to be disappointed in the result.

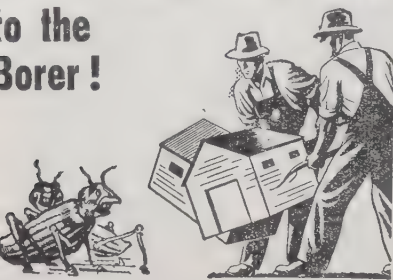
Cash or Credit?

Payment may be made by cash, or with the use of credit. Today almost any article of household equipment or furnishings can be bought on the instalment system. Instead of paying for the article at the time of purchase, the buyer makes a deposit (sometimes not even this is required) and pays the balance in a number of weekly or monthly instalments. The advantage of instalment buying is that it gives immediate possession of articles of a greater value than the cash resources required to obtain them. Some families also find it effective as a form of compulsory saving. The disadvantages are that ultimate cost is increased, and a charge is laid on future income for a considerable period. It is unwise, therefore, to use such credits for articles which will soon wear out, or in such amounts that payments will be an undue strain if income should for any reason decrease.

The money cost of credit is easily found by comparing the strictly cash price with the total instalment payments. In a typical case an article selling for £9 19s. 6d. cash is offered

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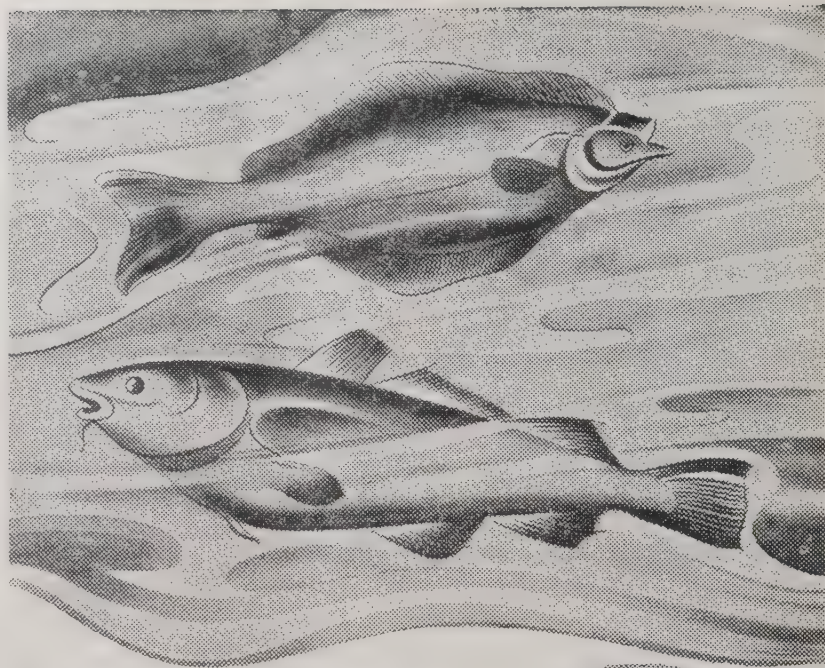
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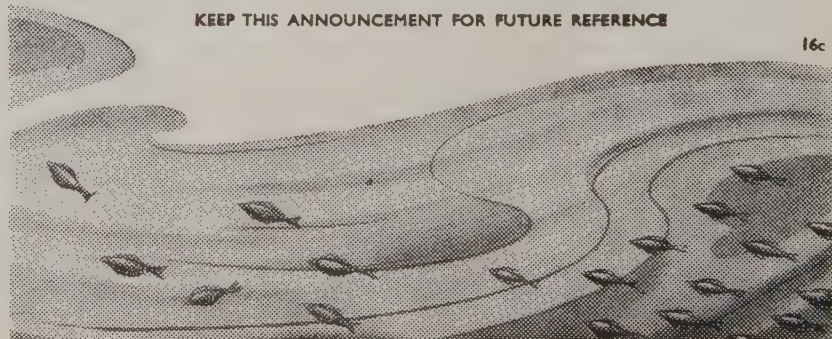
In wintertime, when the sun takes a spell, you can fortify your store of Vitamin D by taking fish-liver oils — plus, of course, as much sunshine as you can get.

Young children (from one month) — 1 to 2 teaspoons each day.
Older children and adults — 1 teaspoon each day.

● Vitamin D is the agent which enables the body to make the best use of your calcium and phosphorus intake. It helps to build sturdy bones and teeth and an upright figure.

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at 2s 3d. weekly for 98 weeks, a total of £11 0s. 6d., the difference being £1 1s. Such credit costs are equivalent to rates for loans of 10 per cent. to 20 per cent. per annum, sometimes higher, rarely lower. Good general rules to observe are: Read agreements carefully, make the initial payment as large and the repayment period as short as you can, and buy from a reliable firm.

Reliable Workmanship

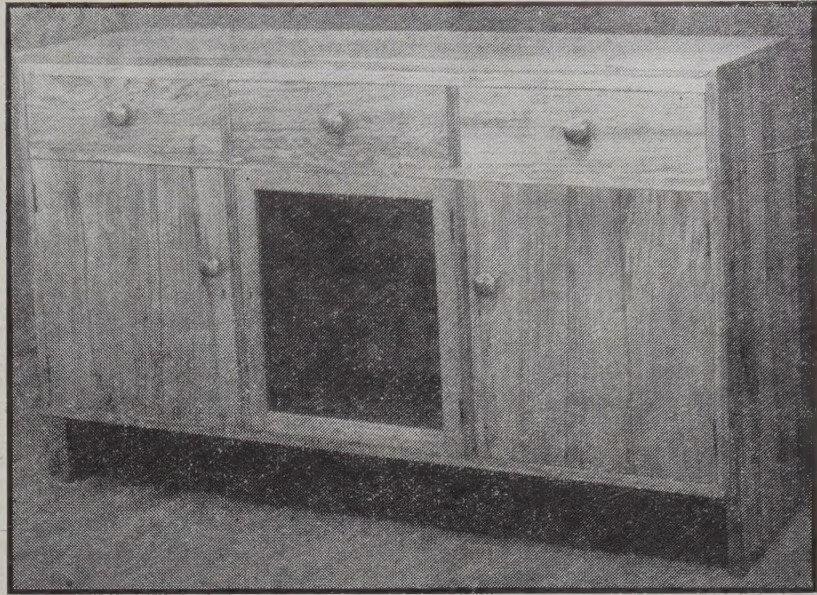
A reliable firm is, in fact, one of the best guarantees for unskilled buyers. Furniture can very easily be "faked" by showy finishes or poor construction and poor materials in concealed places. Remember that ornamentation adds to cost, and is no substitute for a good framework.

Points to check are firmness—no uneven legs, wobbly joints, or loose drawers—no roughness in finish inside or underneath, screws and not nails used where such reinforcement is necessary, and easy movement if the article is fitted with castors. Ask to know the type of wood and whether veneers or plywood have been used in construction; occasionally this information is given on labels. If at all possible, try to shop in the morning or early afternoon when shops are less crowded and the assistants will have more time to show their stock and answer your questions.

Another thing to look for is the

mark of the New Zealand Standards Institute. If this appears on the furniture, it is a guarantee that the materials used and the methods of construction meet certain specified standards.

WHEN YOU BUY FURNITURE



[Sparrow Industrial Pictures Ltd. photo.]
A modern sideboard of simple design.

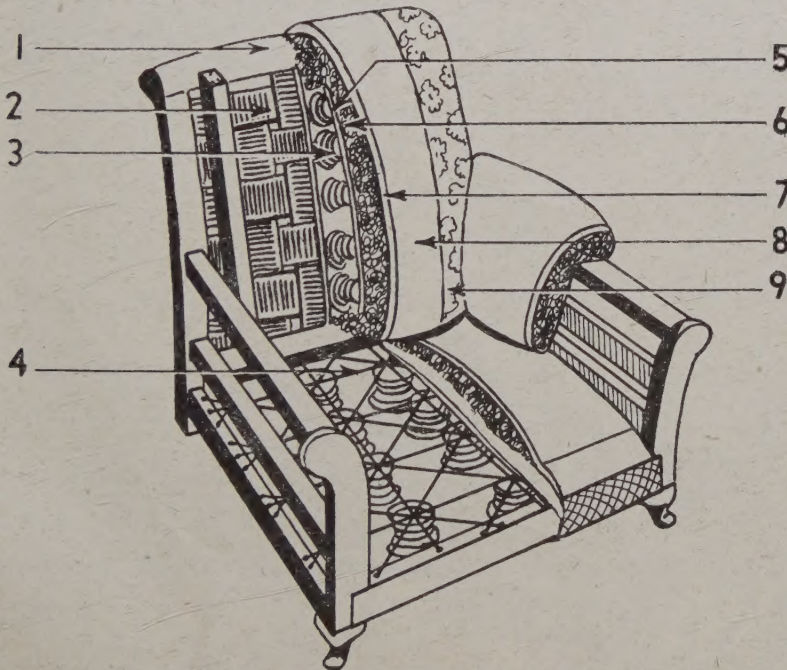
One way of deciding what furniture to buy is to start on the basis of the three conventional suites for lounge, bedroom, and dining room, and to add to them items such as extra chairs, small tables, and bookcases. Selection then is a matter of deciding what colours and general style are preferred, as the main units are predetermined.

In present-day small homes, however, space is restricted and built-in fittings may decrease the amount of movable furniture required, at the same time demanding a greater flexibility in these remaining pieces to compensate for their own rigidity.

Bedroom Furniture

In a bedroom the springs and mattress are the essentials for sleeping on. Extra storage for clothes and personal possessions can be provided most easily by a plain set of drawers. If this is not too tall, and has the top drawer shallower than the others, it will also serve as a dressing table, and a mirror can be hung on the wall above. A small stool can double as a seat or bedside table, and all basic needs are met.

Desirable additions are a comfortable chair, a bedside table with shelves or storage space beneath, and, according to the taste of the occupants, a dressing table, bookcase, another chest of drawers, or even a small flat-topped desk. A single bed of the divan type, provided it has a durable cover and firm mattress, can be used as a seat during the day, and is the basis of the bed-sitting type of room which is becoming increasingly popular for adolescents and for mak-



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6. Plenty of good-quality stuffing.
7. Protective pad of soft cotton over stuffing to give smooth finished surface.
8. Muslin under cover.
9. Upholstery which will resist wear, dirt, and sunlight.

WHEN YOU BUY FURNITURE . . .

ing more use of space which is normally unoccupied in the daytime.

Comfort in Living Room

The first need in a living room is comfortable seats for the family and any friends they entertain. Many people, if given the opportunity, really like to sit on the floor, and a few firm cushions will cater for their tastes. Some people don't really want a whole suite when they buy one; either the chairs or the couch may be more important to them.

It is very difficult to judge quality in upholstered furniture, for it depends on the springs and hidden inner construction. Very cheap articles of this type are bad buys, so if you hesitate to pay the price required for

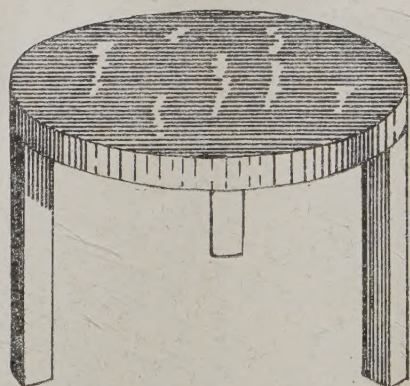
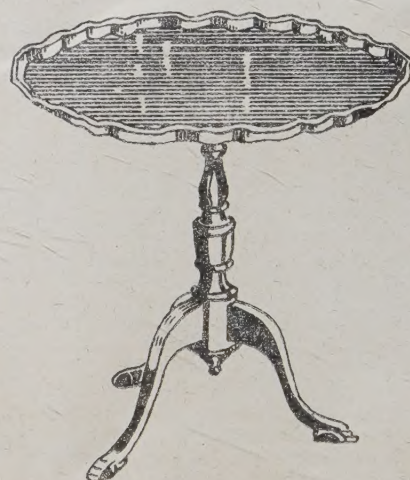
really sound workmanship and durable coverings, or if your room would look crowded with an overstuffed suite, there are several alternatives. ("Overstuffed" is a correct technical term, but unfortunately it is often an only too accurate descriptive one as well.)

A box ottoman placed between two chairs will give their occupants somewhere to put their feet up. A divan with its back to the wall, a chest or low table at each end, and bulky cushions or a built-out section behind will be comfortable to sit on, and very useful as emergency sleeping accommodation, especially if there is no spare bedroom in the house.

Small tables should be sturdy, with a large enough surface area to accommodate books and magazines, cups,

ashtrays, reading lamps, and other paraphernalia in use, as well as flower vases and ornaments.

If the dining table and chairs are in the living room, they will inevitably be called into service for games, extra seats, occasional homework, and sewing. A durable finish is essential, and chairs should be not too high and really comfortable to sit in. The type of table which can be extended to two longer sizes from its original seating capacity of four or six is best for such rooms.



Two small tables illustrating ornate and plain styles.

The kitchen and its equipment will be the subject of later articles. Most kitchens require nothing but a table and chairs to complete them. A small table or desk for the housewife to keep her recipe books and accounts, and a comfortable chair or couch for visitors or a few moments' relaxation can be added if the room is large enough.

Tastes and needs change with the years; articles bought to "make do in the meantime" have a habit of clinging tenaciously to life; the things you have always wanted are probably unobtainable. Simple furniture is most likely to give permanent satisfaction.

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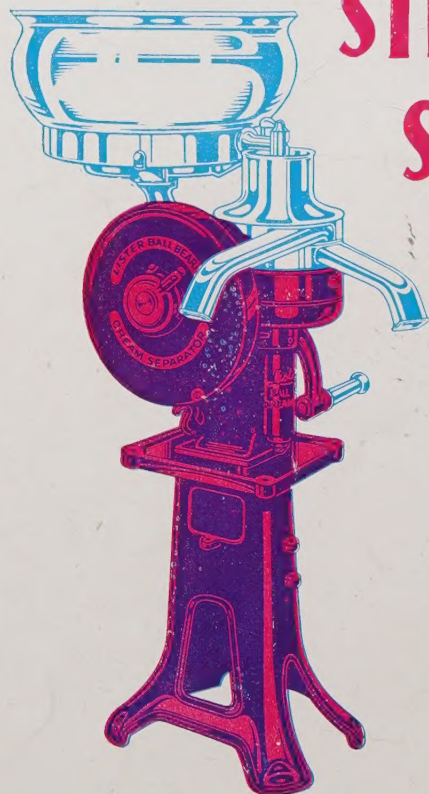
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